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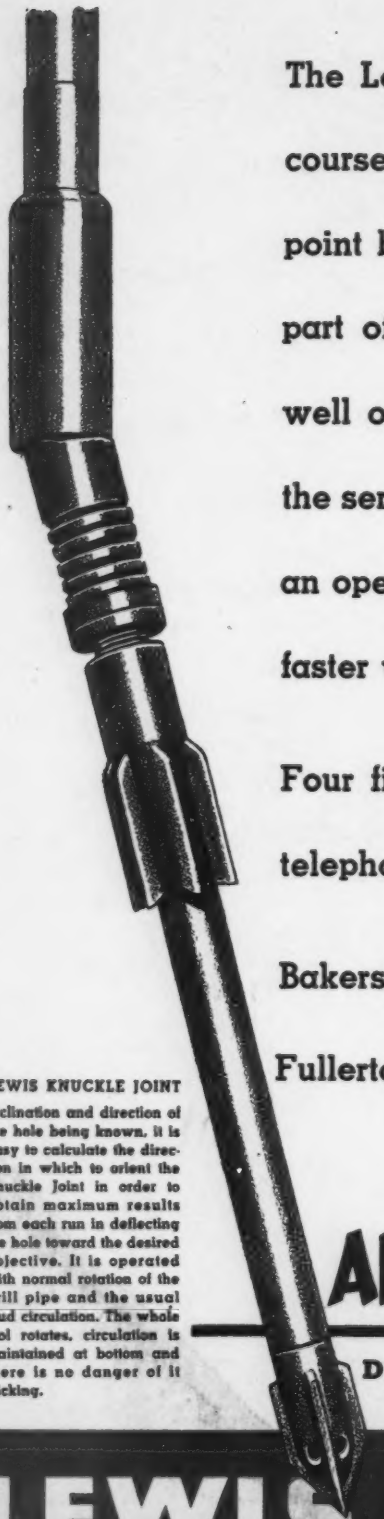

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THE AUTHORITY ON THE CALIFORNIA OIL INDUSTRY

OCTOBER 20, 1937
VOL. 30 » NO. 20
WHOLE NO. 1499

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California Oil World and Petroleum Industry is published twice a month at 536 Petroleum Securities Bldg., 714 West Olympic Blvd., Los Angeles, California. Entered as Second-class Matter January 1, 1937, at the post office at Los Angeles, California, under the Act of March 3, 1879. Subscription price: $1 per year in U. S. and possessions, $2 in foreign countries, including Canada. Member of the Audit Bureau of Circulations.

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A Ridiculous Situation

In connection with the State Board of Equalization report showing gasoline tax assessments of $4,648,400.01 for August, which is published on another page of this issue, it is interesting to note that the state had, in the Motor Vehicle Fund, a cash balance of $24,420,094 on July 31, the latest month for which figures are available. The balance was not all surplus, of course, some of it being held until completions of contracts under which highway construction is proceeding, nor was it all derived from the gasoline tax. It is impossible to state just how much of the fund came from motor vehicle license fees, and how much from the gasoline tax, but it is generally known that the gasoline tax, bringing in money at the rate of more than $4,500,000 per month, is responsible for by far the greatest part of the money in the Motor Vehicle Fund at any one time.

Collections for the present biennium are estimated to be approximately $99,000,000—nearly $50,000,000 per year. This estimate is considered to be conservative, in spite of the fact that it exceeds the governor's estimate of collections. Collections for the first eight months of this year alone and from the gasoline tax alone, which total $34,214,445, indicate that the estimate will not be far wrong, if indeed it is not too conservative.

The figure of $50,000,000 per year for the next two years compares with collections of $30,000,000 for the year 1930, yet during 1930, no one complained about the roads in California. In the meantime, 3070 miles of roads have been built or rebuilt—leaving just that many fewer miles to be rebuilt. Is there, then, any sane reason why gasoline taxes shouldn't be reduced to two cents per gallon?

That tax level would have returned $3,098,733.34 to the state in August, which approaches $40,000,000 per year without taking the various license fees into consideration, and the state still would be considerably ahead of collections in 1930—a year in which, to repeat, no one made any kicks about the highways.

The situation has come to be almost ridiculous—and it would be ridiculous if it didn't cost the people, and the oil industry, so much money. There is so much money in the fund that the state can't spend it fast enough; there are fewer miles of road left to be built; there are ever-increasing numbers of cars on the highway, with the corollary that more gasoline will be used.

The oil industry has an educational job to do. It should tell the people of the state about the situation outlined here, and it should see that they understand it. If the people understood the true condition of affairs—and the only way possible for them to understand it is for the most interested party, the oil industry, to tell them—they themselves would see that gasoline taxes were lowered, with the full confidence that no damage would be done to the highway program.

Engineers Told Of Wilmington Problems

Paper entitled "The Wilmington Oil Field" describes history of field and tells of various problems met in drilling operations in the area, as well as giving brief description of geography and casing programs.

By E. J. BARTOSH
Bankline Oil Co.
Before the A.I.M.M.E., Petroleum Division, Oct. 1, Los Angeles

The Wilmington oil field is one of the most active in the state today and in the brief period from November, 1936, to September, 1937, developed far beyond all expectations. Decline in some wells appears very rapid, but it is too early to draw definite conclusions as the majority of wells are maintaining very large and steady output. Heavy curtailment in the central area, which has developed the largest wells, makes it impossible to arrive at a satisfactory estimate of decline.

The field is producing oil from the Repetto (lower Pliocene) and Puente (upper Miocene) formations, which are of the same age as formations producing at Torrance, El Segundo, del Rey or the marginal fields of the Los Angeles basin. All of these fields are underlain by schist. The Long Beach field located northeast of Wilmington is productive throughout 3000 ft. of Repetto-Pliocene series and also approximately 3000 ft. of Miocene formations, whereas at Wilmington only 700 to 800 ft. of Repetto and 2500 ft. of Miocene formations contain oil and gas.

I shall give a brief summary of the history and development of the field to Sept. 15, 1937, showing the subsurface conditions as they exist with the field only partially developed.

History of Development

Location and Discovery—(Fig. 1)

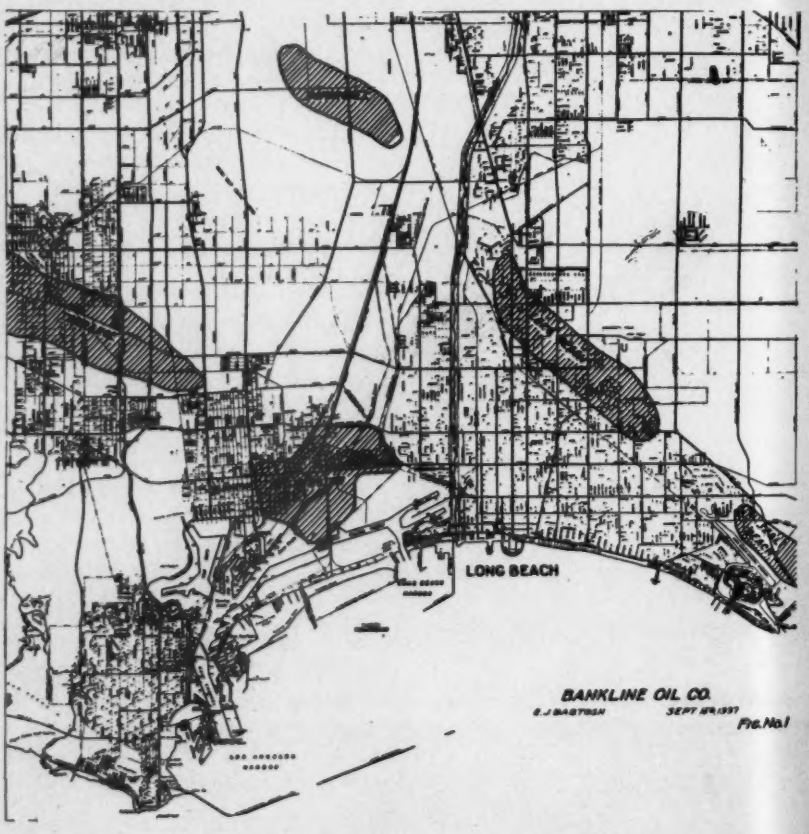
The Wilmington oil field, located 20 miles due south of Los Angeles and adjacent to Los Angeles Harbor and about midway between the cities of San Pedro and Long Beach, was producing oil as early as 1932 and only came into prominence as a major oil field of Southern California in the fall of 1936, when the General Petroleum Corp. of California completed Terminal No. 1 from the upper Miocene, at a depth of 3625 ft., for a daily production of 1500 bbls., 20 gravity A.P.I., thereby establishing discovery of the Terminal zone.

Early Development—(Fig. II)

As early as 1925 or during the close of the development of Torrance, a number of wells were drilled in the Main Street area looking for possible extensions of the Torrance field. Most of these wells were definitely edge wells and low structurally with regard to both Torrance and Wilmington fields. From 1925 to 1932 a few wells were drilled southeast of this area and in January, 1932, well "A" was completed on the pump at a depth of 3786 ft. in the Repetto formation for an initial of 75 bbls. daily of 13.0 gravity oil, thereby establishing discovery of the Ranger zone. Subsequent drilling by various operators in wells indicated in Fig. II, Table I, as "B", "C", "D", "E", "F" and "G" proved better production southeast of the original area, all producing oil from the Repetto (lower Pliocene), and "H" and "I", drilled in 1936, definitely proved a major field existed. Well "G" was completed June 11, 1936, in the upper portion of the Ranger zone for initial production of 195 bbls. daily of 17.4 gravity oil, well "H" for 125 bbls. daily of 16.0 gravity, in November, 1936, and well "I", in November, 1936, for 1500 bbls. daily production from the Terminal zone (Miocene).

The discovery of the Tar and Terminal zones may be attributed directly to a structural interpretation of the area in which a seismograph may have played an important part. This well was higher structurally than any well previously drilled. The subsurface work on the early wells may be credited for the discovery and later development of the Ranger zone.

Subsequent work in the subdivided area in the northerly and westerly parts of the field precipitated a drilling campaign which began in December, 1936, and reached a boom period when major operators with large acreage began offset drilling. On May 12, 1937, 83 wells had been completed and 47 were drilling. By June 1, 1937, 108 wells had been completed for a potential daily output of 65,985 bbls. Curtailment became effective on June 2 in the central part of the field, and production averages for July



were 48,794 bbls. daily from 180 wells. This was a daily average of 271 bbls. per well.

The development at this stage shows the general structural features determined by early drilling. The expectation of a rise in structure to the south and east was well founded because the present developed area extends beyond all previous conceptions of the field. The proven area now covers only the central, northerly and westerly portions of the strtucture, leaving the easterly and southeasterly portions unknown.

Geology (Fig. III)

The surface formations are San Pedro-Quaternary sands and gravels varying in thickness from 500 to 700 ft. and lying unconformably upon the upper Pico-Pliocene formation.

The upper Pico rests unconformably upon the Repetto (lower Pliocene) in the highest part of the field, whereas on the north flank and low fault block the middle Pico member is apparently overlapped by the upper Pico, leaving an unconformable contact between the middle Pico brown shales and the Repetto. This unconformity is very noticeable in all electrical logs, particularly in the west and central areas where a very sharp break in the electrical curve, due to low restivity, is discernible. Interpretation of these curves also indicates brackish water sediments down to this hiatus and that all sands below or in the Repetto, not containing oil, have a very saline water.

The Repetto (lower Pliocene) and upper Puente (Miocene) contact is normal. The upper Miocene is marked by the predominance of grey white diatomaceous shale with thin partings of oil sands for the upper 100 ft., grading to platy and brown massive shales (commonly referred to as "poker chip" shale). Numerous hard calcareous or porcelaneous shales are found in the Miocene column. This Miocene section is fairly uniform from the contact down to the middle Miocene formation which is en-

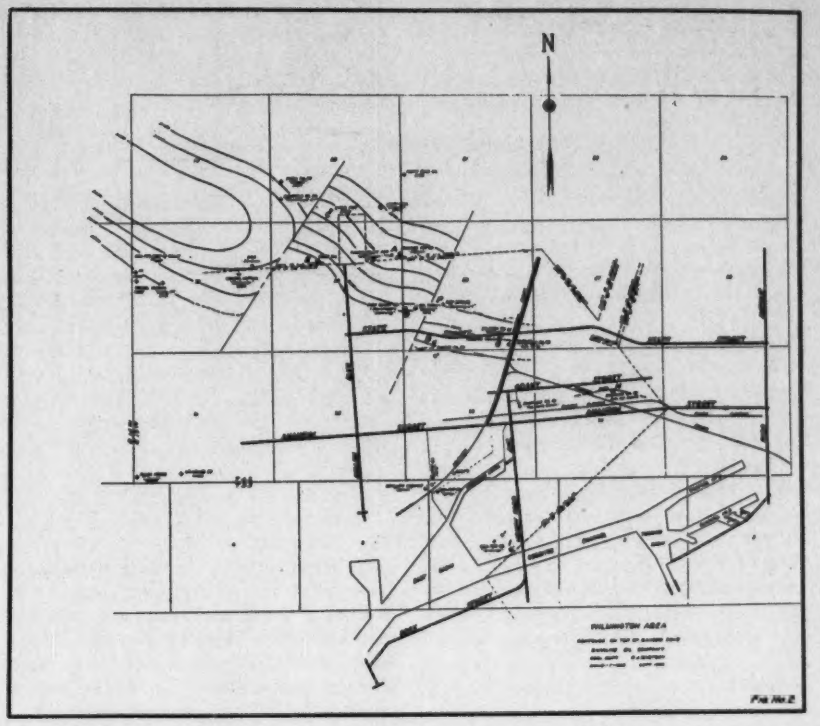
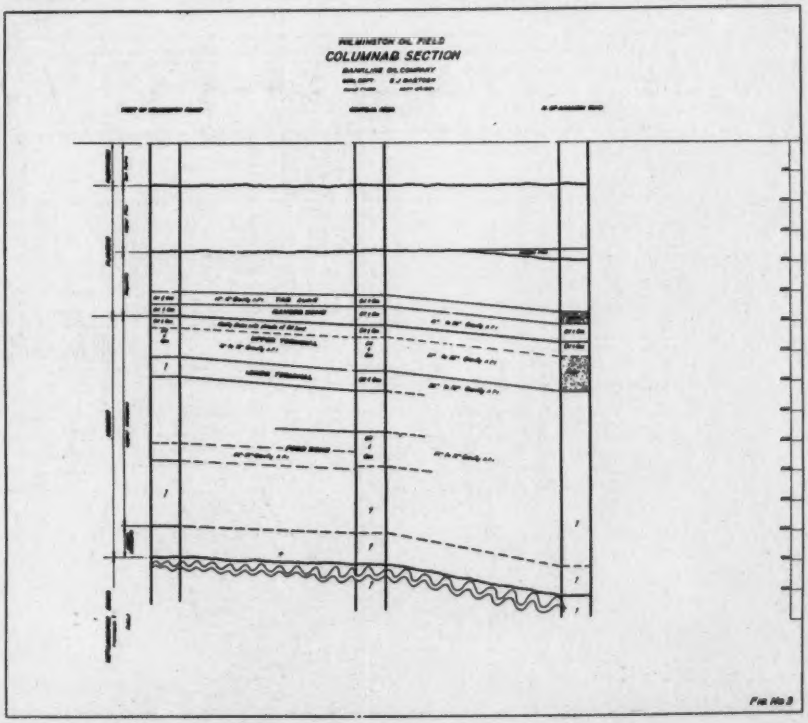
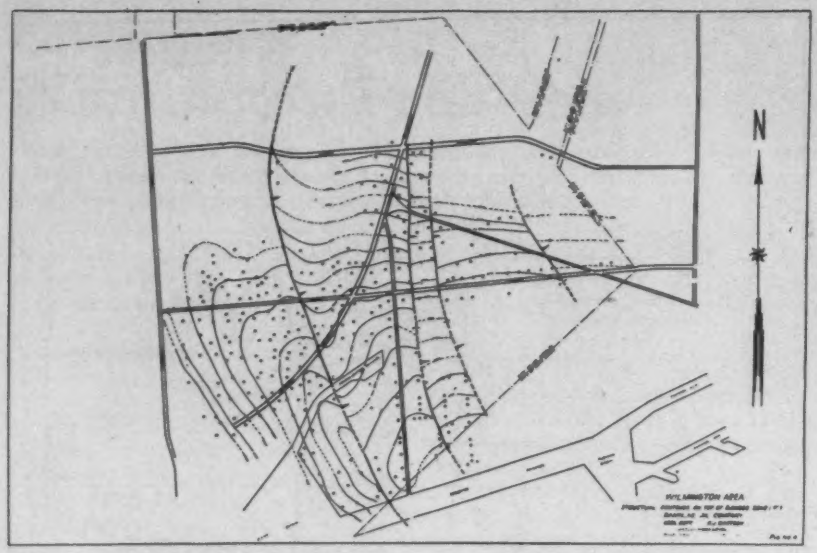


Table I

Well	Completed	Total Depth	Plug Depth
"A" Ranger Petroleum Co., Watson No. 2 ..... Pumping, initial prod. 75 bbls. daily, 13.0 gr.	1/26/32	3821′	3786′
"B" (Chas. Baehr) Sunset Oil Co., Lupie No. 1 ..... Pumping, initial prod. 100 bbls. daily, 15.8 gr.	6/28/33	3634′	
"C" Eyer Petroleum Co., well No. 1 ..... Pumping, initial prod. 75 bbls. daily, 14.5 gr.	4/2/36	3794′	
"D" (Sovereign Oil Corp.) Royalty Service Corp., Banning No. 1 ..... Pumping, initial prod. 150 bbls. daily, 15.0 gr., 4.0% cut.	5/8/36	3663′	3535′
"E" Codri Oil Co., Well No. 1 ..... Pumping, initial prod. 40 bbls. daily, 13.0 gr., 5.0% cut.	8/14/36	3901′	3540′
"F" Royalty Service Corp., Banning No. 11-1 ... Pumping, initial prod. 100 bbls. daily, 13.0 gr., 3.0% cut.	8/8/36	3758′	
"G" Harbor Drilling Co., well No. 1 ..... Pumping, initial prod. 195 bbls. daily, 17.4 gr., 5.0% cut.	6/11/36	3566′	
"H" Bankline Oil Co., D.H.C. No. 5 ..... Pumping, initial prod. 125 bbls. daily, 15.0 gr., 3.0% cut.	11/5/36	4337′	3507′
"I" General Petroleum Corp. of Calif. Terminal No. 1 ..... Flowing, initial prod. 1440 bbls. daily, 20.0 gr., 3.0% cut.	12/6/36	6814′	3625′





countered at 6425 ft. The middle Miocene formation continues on down to the top of the Franciscan (?) schist which has been found at 6787 ft.

Structure

Topography of the area is very gentle and ranges in elevation from 10' to 40 ft. There was very little evidence of structure except in the slight elevation in surface east of the Flood Control channel. All work was of subsurface nature previous to the time intensive drilling began and after discovery of Tar and Terminal zones.

Magnetic[1] and drill pipe orientation of cores from some of the early wells aided materially in determining subsurface structural trend, and since the field has developed, the results of these early magnetic orientations have been confirmed. (Fig. IV).

The field may be described as a faulted and irregularly shaped dome with major faulting transverse to principal axial trends.

There are four normal faults outlined by present development as shown on Fig. V.

1. In the westerly part of the field, the Wilmington fault with a throw varying from 160 to 275 ft. measured at Miocene contact has an average hade of 30 degrees easterly. The hade of this fault decreases north of Anaheim Boulevard.

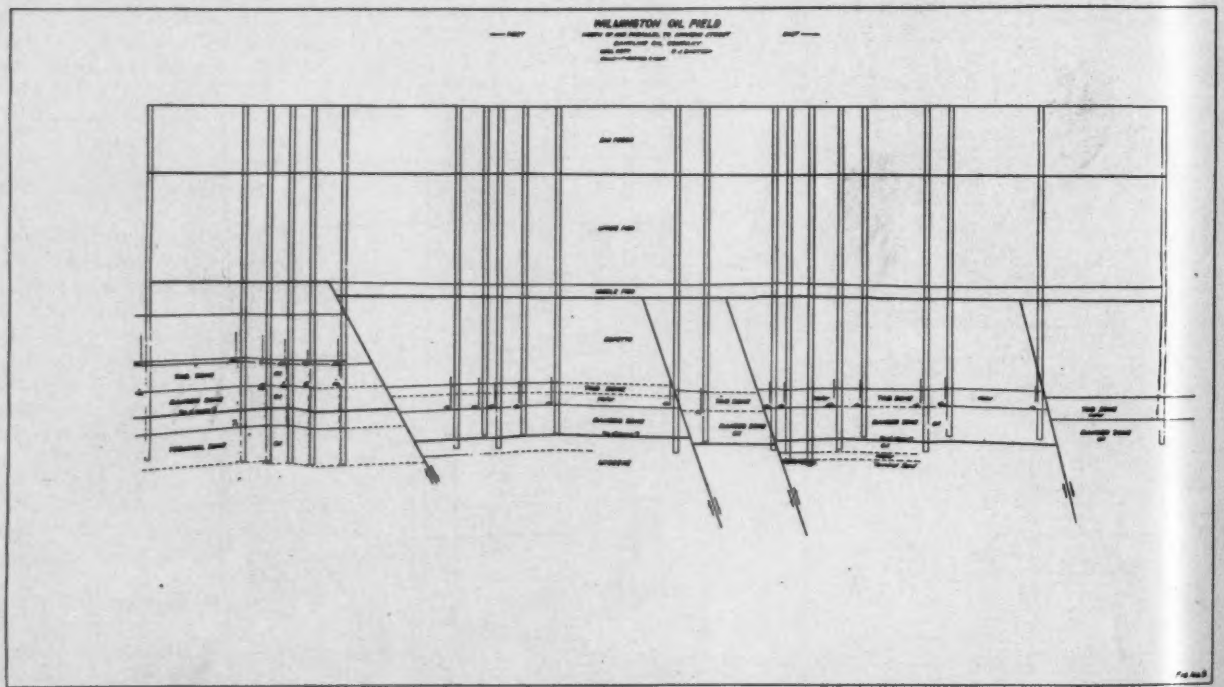
2 and 3. Two other parallel faults of less magnitude with the same general trend cut through the central part of the field east of Ford Avenue, and for discussion purposes will be referred to as the Graben faults. The west fault hades 20 degrees easterly with a throw of 30 to 60 ft., and the east fault also hades 20 degrees easterly with a throw of 50 to 80 ft.

4. The fourth fault and most easterly, herein referred to as the Dominguez Harbor fault, with beds upthrown on the west and downthrown on the east with a displacement of approximately 100 ft., hades about 15 degrees easterly and leaves a large upthrown block on the north flank of the structure.

The major faulting apparently occurred near the close of Miocene time, as determined from the detailed study of electrical logs the Miocene stratigraphy appears very uniform.

The overlying Pliocene, normal at the contact, shows considerable thickening of shales in the depressed areas and gradational increase in sands on the high portion of the fault blocks (Fig. VI). There is also a progressive thickening of the sands to the north and at certain

[1]Lynton, E. D., "Laboratory orientation of cores by their magnetic polarity," A.A.P.G. Bulletin, Vol. 21, No. 5.



structural levels a large amount of carbonaceous material, also shore line forms of megascopic fossils, which probably indicates a regressive sea during the period of deposition and due to the progressive uplift of the region southwest of the area.

Oil and Gas Zones

There are five producing zones proven:

1. The Tar zone (Repetto, lower Pliocene) ranges in depth from 2400 to 2800 ft. with a thickness of 225 to 350 ft. This contains an average of 95 ft. of oil sand, or approximately 33%. The zone is marked by very micaceous silts at the top, grading downward to fine and coarse oil sands. The gravity of the oil ranges from 12.5 to 15 degrees A.P.I. This oil has a gasoline content of 0.00 to 3.73% and a sulphur content of 1.94 to 2.43%.

2. The Ranger or "F" zone (Repetto, lower Pliocene) is encountered at depths of from 2600 to 3500 ft. with a thickness of 200 to 340 ft. This zone is marked by firm clayey shales at the top with calcareous concretions in places, with abundance of micro fauna. The principal oil sands lie in the upper 200 ft. and grade from medium to coarse grained oil sands to dense massive shales, with numerous thin lenses of fine oil sands in the lower part. The total oil sand is from 75 to 130 ft. or approximately 35% of the zone. The oil in this zone ranges from 14.4 to 23.4 gravity A.P.I., and initial production varies from 50 to 3000 bbls. per day. The gasoline content ranges from 3.0 to 21.0%, and the sulphur content varies from 1.22 to 2.20%.

3. The Terminal or "H" zone (Puente formation, upper Miocene). The top of this zone is encountered 200 ft. below the Miocene contact at depths of 3050 to 3450 ft. Productive thickness of the zone varies from 40 to 600 ft. and consists of alternate sands and brown shales with approximately 50% of the zone being oil sand. Initial production ranges from 300 to 2000 bbls. daily of 17.0 to 25.0 gravity oil. The lower gravity oil is found in the area west of the Wilmington fault. The sulphur content varies, according to gravity, from 1.34 to 2.5%, the lighter oil having the lesser amount of sulphur; and the gasoline content is from 7.60 to 17.65%.

4. The Lower Terminal (Miocene) is encountered at depths of 3650 to 3800 ft. and has a thickness of 300 ft. with an initial production of 2500 bbls. daily of 27 to 31 gravity oil A.P.I. This zone also consists of about 50% oil sand. The sulphur content is 0.89% and the gasoline content is 34.0%.

5. The Ford zone is encountered at 4800 to 5100 ft. with a thickness of 500 ft. and has an initial production of 500 to 700 bbls. daily of 31 gravity oil A.P.I. It also consists of about 50% oil sand. The sulphur content is 0.81% and the gasoline content 30.97%.

In some parts of the field it is a common practice to produce the Tar and Ranger zones together or the Ranger and Upper Terminal zones or the Upper Terminal and Lower Terminal zones. This, of course, is done only where no intervening water is present.

The largest well to-date is a combined Upper and Lower Terminal zone well and has developed a potential production of 7700 bbls. per day of 30 gravity A.P.I. oil, with 3500 mcf of gas.

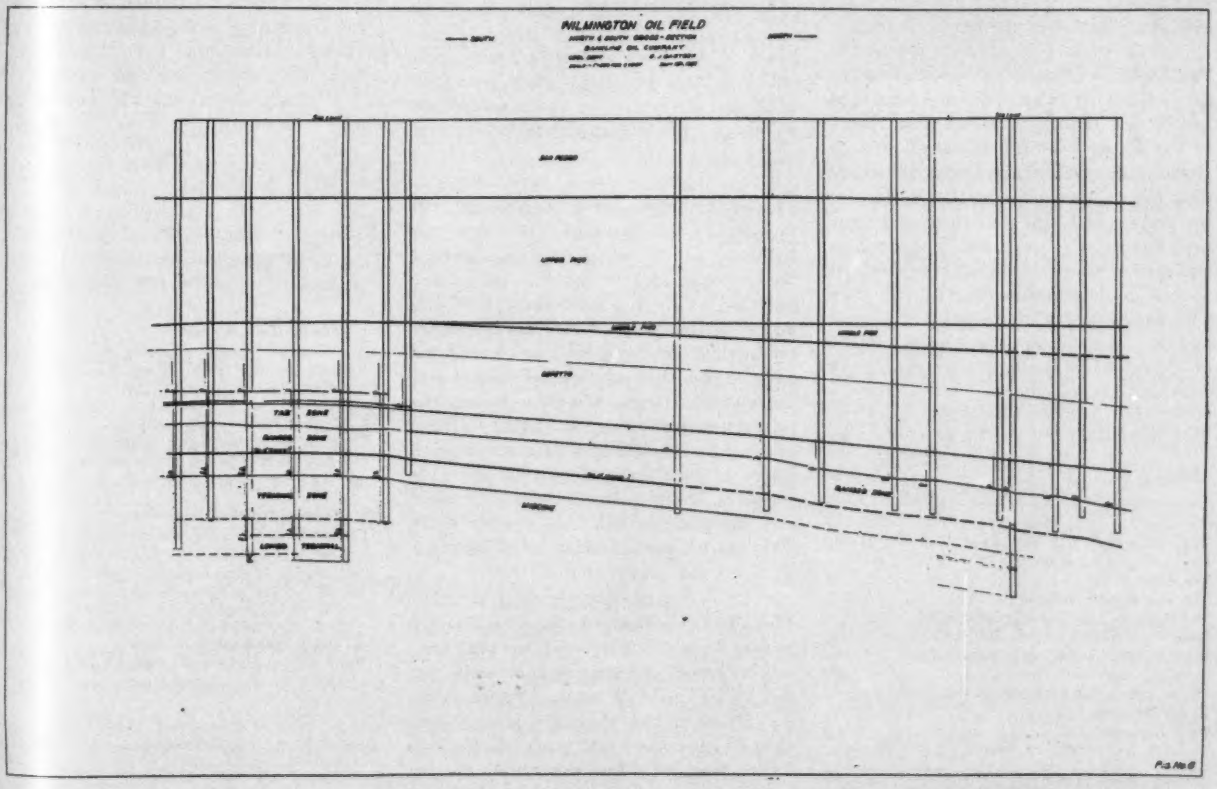
Unlike some of the major fields in the Los Angeles basin, this field shows no high pressure gas zones overlying the oil measures. The majority of the flowing wells yield a very low volume of gas at first and as the rate of withdrawal increases the volume also increases. The Ranger zone shows volumes of 50 to 550 mcf per day. Some of the Miocene

Table II

Area or Acreage of Proven Zones

The probable proven acreage of each zone is:

Tar zone	1200 acres
Ranger zone	2100 acres
Terminal zone	1200 acres
Lower Terminal zone	500 acres
Ford zone	500 acres



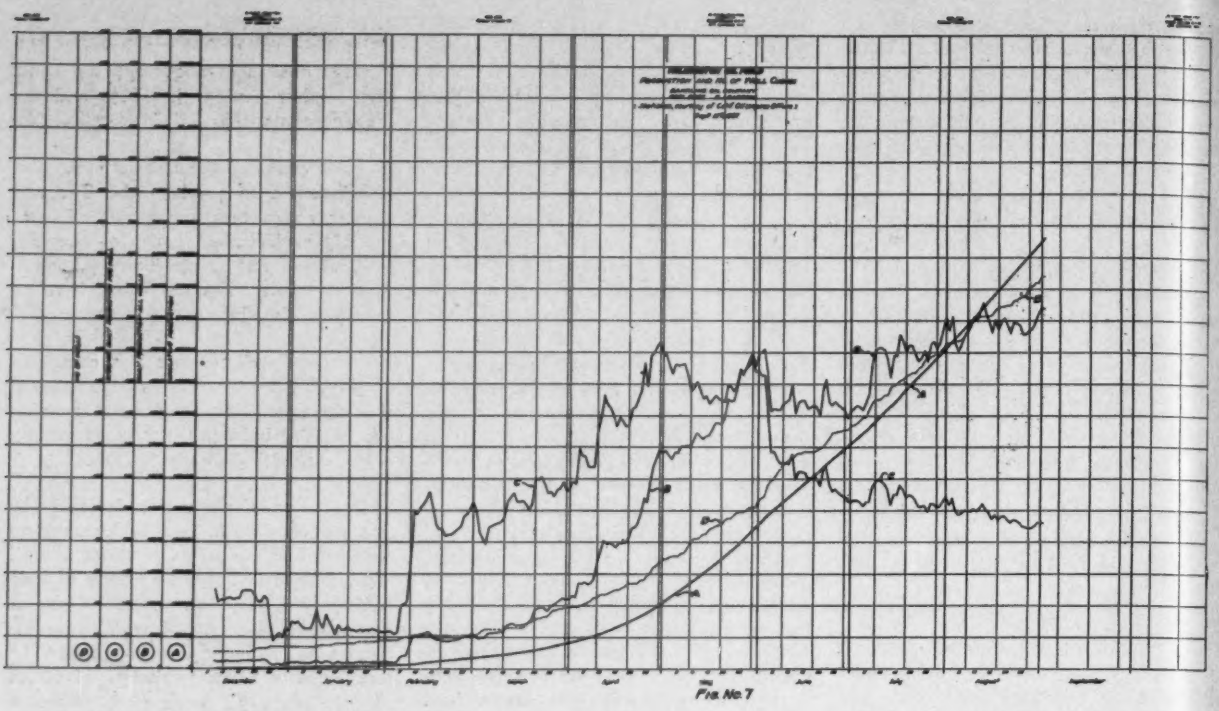


Fig. No. 7

zones have shown larger volumes of gas in the central area. These wells have developed volumes of 50 to 3500 mcf. The gasoline content varies according to pressure and zones and is from .50 to 2 gallons per mcf. (Table II.)

Drilling Program

City and State Regulatory Measures

That portion of the field included in the City of Los Angeles is divided into light and heavy industrial zones. The light, or "D", zone requires approval of zone change by the Planning Commission and City Council together with signature of the mayor, and well derrick permit from the Board of Fire Commissioners, in addition to the well-known requirements of our State Division of Oil and Gas. The heavy, or "E", zone is more simple and only requires approval by the Board of Fire Commissioners and compliance with state requirements.

Methods

Drilling is done entirely by rotary method. Steam and gas engines and electric Hild drives are used. The drilling time to completion at depths of 3300 to 3600 ft. is 18 to 30 days.

Drilling is comparatively easy and no unusual hazards, such as high pressure gas, caving shales or loss of circulation, have been encountered.

Most of the wells are drilled with fishtail bits, and occasional rock bits are used in drilling the hard calcareous members of the Ranger and Terminal zones.

The customary practice has been to drill a well to the Tar zone, then run an electrical survey which has been one of the greatest aids in making subsurface correlations in this field along with the micro paleontology which has definitely established the principal marker horizons, thereby simplifying correlations of the electrical logs. After cementing the primary water string, the well is drilled to what is considered a safe penetration in the oil zone and a second survey made prior to landing of oil string or liner and making combination shutoff tests. The casing type formation testers are used for the water shutoff tests.

The size of perforations in the oil string ranges from 30 to 80 mesh vertical slotted, although the majority of wells are completed with 80 mesh. There is no definite proof that the wells using larger casings have produced more oil to date. There may be a few exceptions to this statement but I believe the ultimate recovery of individual wells completed in the same structural position and in the same zone will be an important factor in this problem of larger casings.[2]

Cost of drilling wells ranges from $30,000 to $60,000 for average Ranger and Terminal zones, although in certain areas foundation and excavating or road building increases the cost considerably as all piers and concrete corners must be set on piling due to the soft and soggy nature of the top soil.

Casing Program

The casing program for different wells varies according to the different areas and type of oil zone encountered.

1. **Typical Tar zone well:**
16, 18 or 20" conductor casing 90 to 150 ft.; 10¾, 11¾ or 13⅜" water string 2200 to 2600 ft.; 6⅝, 7, 8⅝ or 9" oil string 2500 to 2900 ft.

2. **Typical Ranger zone well:**
13, 16, 18 or 20" conductor casing 90 to 700 ft.; 8⅝, 10¾ or 11¾" water string 2700 to 3600 ft.; 6⅝, 8⅝ or 9" oil string or liner 2900 to 3800 ft.

3. **Typical Terminal zone well:**
Conductor casing and primary water string the same as Tar zone well;
6⅝, 8⅝ or 9" oil string or liner landed at 3600 ft. with a combination shutoff at the top of the Terminal zone.

4. **Lower Terminal zone well:**
Same as Upper Terminal except additional 4½ or 5½" liner or oil string down to about 4000 ft.

Table III

The number of wells and zones from which they are producing is as follows:

Tar zone wells	12
Tar and Ranger zone wells	13
Tar, Ranger and Terminal zone wells	1
Ranger zone wells	88
Ranger and Terminal zone wells	64
Terminal zone wells	70
Upper and Lower Terminal zone wells	9
Lower Terminal zone wells	1
Ford zone wells	2
	360

[2]Parks, E. K., "Selection of Sizes of Oil Strings in California," A.P.I. paper No. 801-13-G, Los Angeles, April 13, 1937.

5. Ford zone well:
Same as Terminal with additional oil string landed in bottom zone and combination shutoff at 4800 ft.

Production

Fig. VII shows the production curves for the entire field. This graphic picture shows the rapid increase in the total number of wells in the past six months with the peak still an unknown quantity.

A—Cumulative field production;
B—Total daily production;
C—Daily average per well;
D—Broken line indicating number of wells.

On June 2, 1937, the average daily production per well was 463 bbls. Curtailment became effective on this date and, along with decline of early wells, showed a drop in this daily average to 269 bbls. by July 2, and a daily average per well of 230 bbls. on Sept. 1. This is an average daily decline per well of 29% from June 2 to Sept. 1, and from Aug. 1 to Sept. 1, a 12% decline.

Operation

The majority of wells have been completed as normal flowing wells with the customary setting of tubing above the perforations and circulating with water until well would start to flow. A few wells have necessitated swabbing.

Sand is one of the problems in all oil fields, and this field is no exception although conditions are worse in certain portions and may be attributed particularly to the character of the sands, especially the silty and micaceous members. In flowing wells by maintaing a uniform back pressure, very little sand trouble occurs. Sand trouble usually occurs when wells have ceased to flow or a disruption of the bottom hole pressure begins to develop.

An interesting development in this field is the regular meetings which are now being held by operators for discussion of the common production problems, seeking remedies to combat them.

I believe the concensus of opinion is that a careful check of fluid levels with the depthograph, and recording of bottom hole pressures which are being made, will aid materially in determining the proper rate of withdrawal, thereby retarding the shifting and heaving of sands.

In a number of wells, tubing has been set with packers and has prolonged the flowing life of these wells. In certain areas it has been found more practical to pump wells before they have ceased flowing, but in these pumping wells a constant back pressure is maintained with special regulating valves. This regulating of back pressure and the rate of withdrawal appears to be a very satis factory method in retarding the entry of sand into the well. Of course, there may be other methods developed that will enlighten operators in some particular mechanical means of combating this problem of constant maintenance or pulling and bailing of wells.

Pipe Line Facilities

General Petroleum Corp. of California and Richfield Oil Corp. are the only two pipe line companies handling oil from this field. Practically all of the oil produced in the westerly area is shipped by truck to various refineries in the Los Angeles basin.

The price of oil ranges from 40 to 80 cents per barrel, depending entirely upon the gravity and purchasing companies.

Conclusion

To date, with one half of the field partially developed, there are approximately 2100 acres of proven oil land. The rapid development due to competitive drilling reached a potential of 113,455 bbls. per day for the month of August, 1937, from 204 wells. Production as of Sept. 1, 1937, is 56,955 bbls. per day from 248 wells with quite a number of wells heavily curtailed in the higher portion of the field. The field produced a total of 6,804,380 bbls. from Dec. 7, 1936, to Sept. 1, 1937, but it is too early to predict its future production because only the westerly part of the entire potential area has been developed; that portion lying in the City of Long Beach has not yet been opened for drilling.

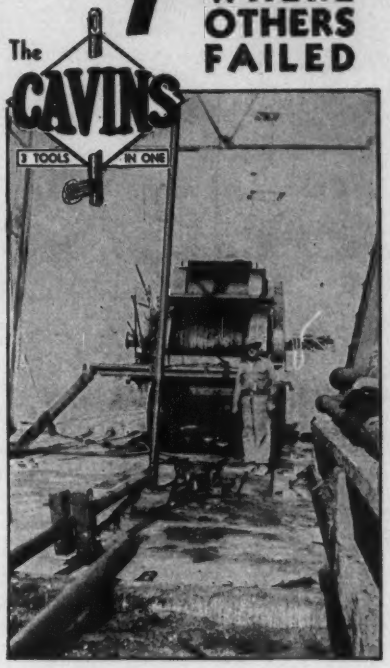
At the present time, or on Sept. 15, there are 260 wells completed, divided into 68 pumping wells and 192 flowing wells (Table III.) Drilling wells have decreased until on Sept. 15 there were only 25 active wells.

With the opening for drilling in the near future of land located in the City of Long Beach, the field should show a large increase in productive area.

Neary Returns From Trip To East

Frank E. Neary, president, Rapid Construction Company, has just returned from the east where he conferred with executives of the various steel companies.

CAVINS
Makes Good
WHERE OTHERS FAILED



The snapshot above tells a forceful story . . . the folly of using old-fashioned and inefficient tools for cleanout work. In the foreground are two types of bailers that failed on this cleanout job and had to be abandoned.

The Cavins Automatic Hydraulic Suction Bailer, standing in the derrick, was third on the job. It got right down to business and had this well cleaned out in jig time. The smiling operator indicated his pleasure . . . it's a pleasure to run the Cavins.

For complete details of the Cavins, send for Bulletin No. 36.

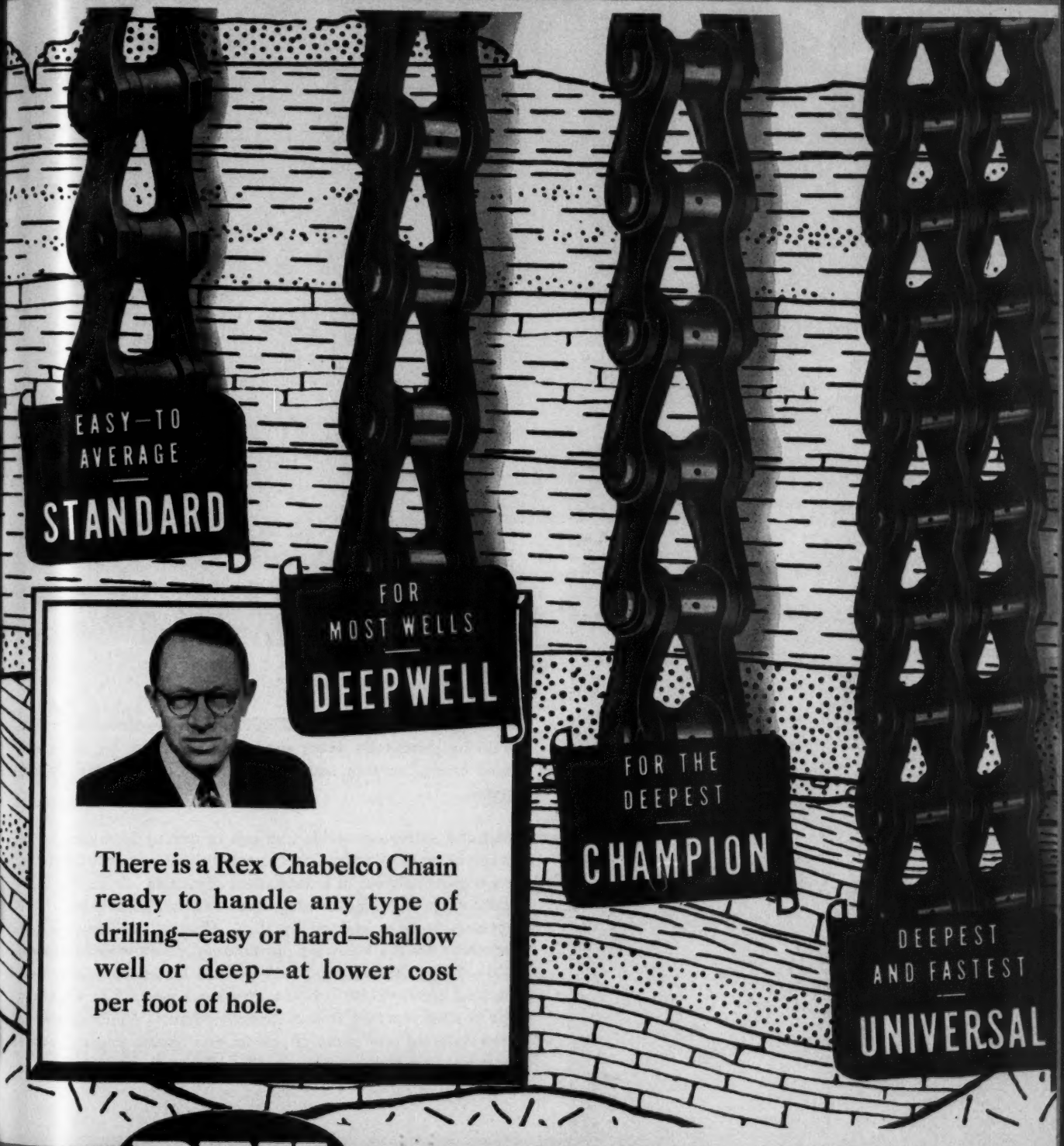
THE CAVINS COMPANY
2653-73 Cherry Ave., Long Beach, California
BRANCHES:
CALIFORNIA: Bakersfield, Taft, Ventura
TEXAS: Houston, Kilgore, Odessa, Big Spring, Monahans, Pampa
OKLAHOMA: Oklahoma City, Perry
NEW MEXICO: Lovington TRINIDAD, B.W.I.

The next article of the series on companies making up the California oil industry of today will appear in the next issue of the California Oil World.

As in the stories of the Standard Oil Co., Shell Oil Co., General Petroleum Corp., and The Hancock Oil Co., which have appeared in the pages of this publication since the first of the year, Mitchum, Tully & Co., California investment dealers will cooperate.

HOW TO HANDLE IT

IF IT IS ANY TYPE OR DEPTH OF DRILLING



There is a Rex Chabelco Chain ready to handle any type of drilling—easy or hard—shallow well or deep—at lower cost per foot of hole.

REX **CHABELCO**

THE GREATEST CHAINS THAT EVER HIT THE OIL FIELDS

CHAIN BELT COMPANY of Milwaukee

10 YEARS OF CONFIDENCE

1927

Untouched picture of Murcell welding units on major company well at Dominguez field taken at 12:05 midnight.

1937

One of Murcell's first welding units to operate in California.

MURCELL WELDING SERVICE is known throughout California by practically every producing company for its experienced crews, modern equipment, and its dependable 24-hour service.

We have safely set welded strings of casing for every major company on the Pacific Coast, most of the larger independents, and a great number of independent operators. Over one thousand strings of casing, totaling over one-half million feet, have successfully been welded by U. C. Murcell, Inc. Included in these jobs are the following outstanding record welded strings: 2000′—22″—123 lbs., 5200′—16″—77.75 lbs., 6400′—13⅜″—61 lbs., and 6100′—11¾″—61 lbs. We are equipped to weld any type of joint you may desire. Specify Murcell Welding Service when ordering any make of casing, and assure yourself of the finest welding service at no additional cost to you.

U. C. MURCELL, IN

548 ROOSEVELT BUILDI

LOS ANGELES, CALIFOR

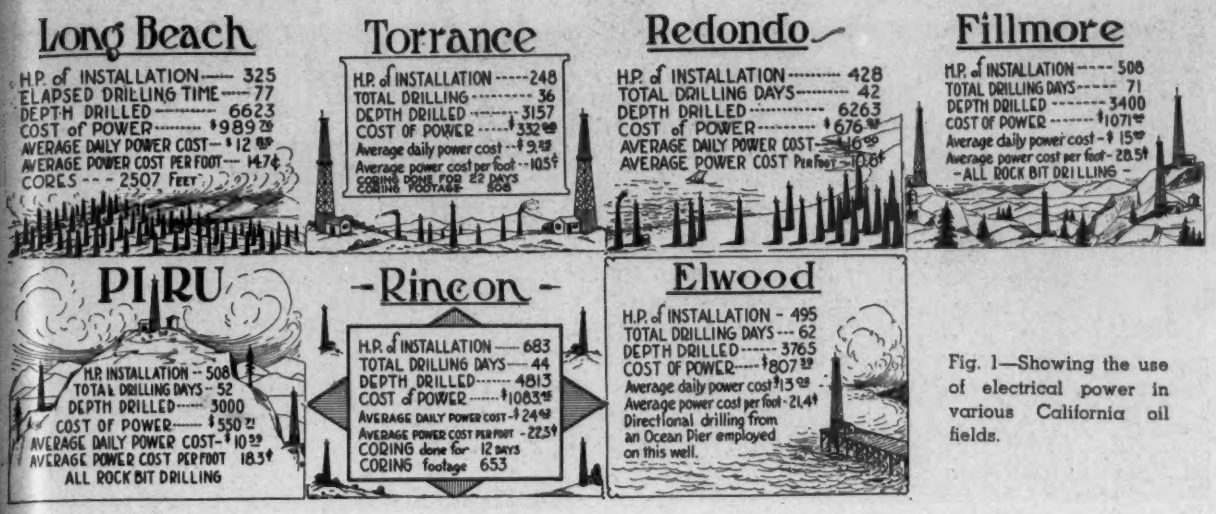

Long Beach
H.P. of INSTALLATION ---- 325
ELAPSED DRILLING TIME ---- 77
DEPTH DRILLED ---- 6623
COST of POWER ---- $989.20
AVERAGE DAILY POWER COST-- $12.85
AVERAGE POWER COST PER FOOT--- 14.7¢
CORES --- 2507 Feet
Torrance
H.P. of INSTALLATION ---- 248
TOTAL DRILLING ---- 36
DEPTH DRILLED ---- 3157
COST OF POWER ---- $332.62
Average daily power cost -- $9.23
Average power cost per foot -- 10.5¢
CORING DONE FOR 22 DAYS
CORING FOOTAGE 805
Redondo
H.P. of INSTALLATION ---- 428
TOTAL DRILLING DAYS ---- 42
DEPTH DRILLED ---- 6263
COST of POWER ---- $676.38
AVERAGE DAILY POWER COST-- $16.09
AVERAGE POWER COST Per Foot -- 10.8¢
Fillmore
H.P. of INSTALLATION ---- 508
TOTAL DRILLING DAYS ---- 71
DEPTH DRILLED ---- 3400
COST OF POWER ---- $1071.62
Average daily power cost - $ 15.09
Average power cost per foot - 28.5¢
- ALL ROCK BIT DRILLING -
PIRU
H.P. INSTALLATION -- 508
TOTAL DRILLING DAYS - 52
DEPTH DRILLED ---- 3000
COST OF POWER ---- $550.21
AVERAGE DAILY POWER COST- $10.59
AVERAGE POWER COST PERFOOT 18.3¢
ALL ROCK BIT DRILLING
- Rincon -
H.P. of INSTALLATION ---- 683
TOTAL DRILLING DAYS ---- 44
DEPTH DRILLED ---- 4813
COST of POWER ---- $1083.42
AVERAGE DAILY POWER COST - $24.62
AVERAGE POWER COST PER FOOT - 22.5¢
CORING done for 12 DAYS
CORING footage 653
Elwood
H.P. of INSTALLATION - 495
TOTAL DRILLING DAYS --- 62
DEPTH DRILLED ---- 3765
COST OF POWER ---- $807.39
Average daily power cost $13.02
Average power cost per foot - 21.4¢
Directional drilling from an Ocean Pier employed on this well.

Fig. 1—Showing the use of electrical power in various California oil fields.

Electrical Power Uses Told A. P. I. Basin Chapter

Paper discusses values of electrical power in various oil field applications.

The following paper was presented by L. S. Peterman of the Southern California Edison Co., Ltd., at the October meeting of the Los Angeles Basin Chapter of the A. P. I. While Mr. Peterman's paper included a discussion of the use of electricity in well pumping, pipeline pumping, and the cathodic protection of pipelines, as well as in drilling, space limitations preclude the inclusion of anything but Mr. Peterman's remarks on the subject of drilling.—Editor.

By L. S. PETERMAN
Southern California Edison Co., Ltd.

The most active drilling area in this vicinity during the past year has been around Wilmington, which is served electrically, by the Los Angeles Bureau of Power and Light. Nevertheless, there are better than a score of electric drilling rigs in operation at this time scattered throughout the territory served by the Southern California Edison Company and all of these outfits have proven time and again their ability to compete with any other type of motive power and can show and demonstrate surprising savings and speed. All that the electrical manufacturers and power companies desire are unprejudiced minds when comparing electric service with other forms of power for drilling. May we suggest, in passing, that you confer with the operators of these electrics and we believe that you will learn from those people direct that the electrically driven rig from draw works to mud pumps has given them lower costs per completed well than they expected.

While low drilling costs made possible by cheap electricity are important to large companies they are even more important to small operators because of less space requirement, less rigging up time, less transportation cost, lower maintenance, lower water cost, lower insurance, longer life and less fire hazard; all of which result in materially reduced drilling costs and yet do not sacrifice anything in ruggedness, flexibility, reserve power or speed.

The ability of the electric rig to start heavy loads from rest and accelerate them to the line speeds to be shown in a subsequent slide, run at reduced speeds for coring and operate the power pumps to equal steam performance even to holding pressure at stall with twice full load must be recognized by operators if they are to keep abreast of up to date drilling practices.

Electric drilling rigs are available in any size, for shallow, medium or extreme depths. Draw works motors can be either of the single motor, twin motor type, gas protected and all controlled by magnetic controllers operated by a small hand throttle wheel at number one post.

Gas protected mud pump motors either of open or forced ventilation type are available for every make and size of power pump. (More about mud pumps later.)

Direct connected motor drive to the rotary table is all worked out and obtainable. It consists of a gas protected motor coupled to the stem of the rotary right on the rig floor, is splashproof and force ventilated. This motor is controlled through a master switch giving 12 operating speeds and located at the driller's position.

I have selected from our records a number of typical examples of drilling jobs completed during the past year.

No doubt most of you are familiar with drilling conditions and drilling problems in the various zones and formations and to present a cross-cut picture of how electric drilling performed, I have selected examples from nearly every part of the Los Angeles Basin (Fig. 1). You will note that the average daily cost of power is quite uniform regardless of the time required and I also wish to advise you in passing that some of the rigs on these jobs have been in service 12 to 14 years, and are still good for many more years of service.

What the boiler installation is to a steam rig, the equipment to the left of Fig. 2, within the enclosure, is to the electric outfit—the transformers, that make available the service from the power house down the line. But compare this installation with a boiler plant. Four boilers will weigh more than all of the electrical equipment with the draw works, table and mud pumps thrown in. Boilers cost a great deal of money, are expensive to transport, expensive to erect and expensive to operate and maintain.

To the right of the transformers and just outside of the enclosure is shown the power company metering equipment and the two assemblies on the right end of the trailer contain the control equip-

Fig. 2

Fig. 3

ment of the 2—125 horsepower twin drilling motors. Power is delivered to all of the motor equipment from this portable substation by means of flexible Tirex cables, shown entering a wooden trough at extreme right end of the trailer.

Fig. 3 shows the other side of the portable substation, showing the two-control assemblies for the twin 125 horsepower drilling motors. All starting, accelerating, reversing and speeds of the drilling motors are accomplished with this equipment through the driller's master control at the No. 1 post.

Fig. 4 shows the twin 125 horsepower drilling motors. Motors are equipped with gas protected rings and are star-delta connected electrically. For the drilling operation, when there is a light load on the motor, the motor may be switched to the star connection by push-button control mounted on the driller's post. When the motor is connected on star it will have a rating of approximately 75 horsepower. Either one or both motors may be used in the drilling operation on the star side, or if the load is too great it may be switched to the delta connection at which time each motor will have a rating of 125 horsepower. Of course, if conditions should arise where one 125 horsepower motor is not sufficient to drill with, the other motor may be used and you have a total of 250 horsepower for drilling purposes. In other words, either one or both motors can be used for the drilling operation on either the star or delta connection. This set-up is made so that the operator will have a fine speed control regardless of the load which he may have to handle.

In addition to the star-delta connection on the motor, each control has a vernier control in that by pushbutton operation one step of resistance may be cut in between any two steps on the main controller. In other words, the main master switch will have eight points of control and by the use of the pushbutton, one step in between each of the eight points giving a total of sixteen points of con-

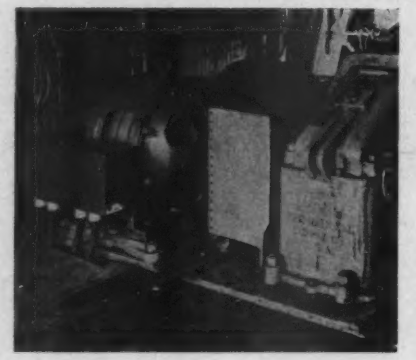


Fig. 4

trol on each motor for either the star or delta connection.

When hoisting, or coming out of the hole, the motors are used on the delta connection at which time they will have a pull-out torque of approximately 4½ times full load. This means that during the hoisting operation, when using both motors, you have a hoisting capacity between 800 and 1000 horsepower.

Easy connection facilities are provided on all equipment which make for speed and convenience in rigging-up. As a matter of fact, all cables can be run out and all connections completed on drilling motors, mud pump motors and their controls in 16 man-hours of labor by the electrician. Sixteen man hours of labor after the equipment has been placed at the drilling site and the equipment is ready for service.

Mud Pump Operation

In the past, one difficulty for electric drive that presented itself was the objectionable characteristics of A. C. mud pump motor operation. Operators have realized that although induction motor driven pumps give efficient and satisfactory service under normal conditions, they have the following objections:

1. Lack of flexibility for certain operations.
2. Possibility of developing excessive and destructive pump pressures.
3. Tendency to deliver a constant volume of fluid regardless of pressure.

A review of these objections shows that they are all directly traceable to the tendency of the electric motor to run at constant speed, regardless of pump pressure.

Drillers are interested in pump pressure and volume, but since pump volume is proportional to the motor speed and pump pressure proportional to the motor torque or turning effort, the successful operation of the pump depends upon correct speed control of the driving motor.

If the motor slows down as the pump pressure increases and finally stalls at a definite value, the results are satisfactory. However, until recently, the characteristics of the electric motor have been such that it did not slow down and when a condition such as a plugged bit was encountered sudden excessive pressures were developed and quite often the water end burst.

Fig. 5

These difficulties or objectionable characteristics have been overcome through reactor control that has been designed for service so that the motor slows down as the pump pressure increases, instead of tending to maintain a constant speed. These changes give results similar to steam driven equipment. A blower is provided to conduct away the additional heat generated in the motor and to compensate for the reduction of the self-cooling action caused by the slowing down of the motor.

Fig. 5 shows a 300-horsepower mud pump motor with the reactor control equipment shown on the left. This motor is driving a 7¾x20 pump through a 21 texrope belt.

This motor, in addition to the stalling characteristic has a number of speed points as well.

The pressure limit determined upon will never be exceeded and as soon as circulation has been restored through clearing of the bit, etc., the motor will start again. Bear in mind, pressure is constantly maintained, but it never becomes excessive or destructive. The operation of these pumps therefore is similar in these respects to steam-driven pumps.

We still hear occasionally the statement that electric drilling is not fast enough. Let's study for a moment the speeds obtainable with one of the new twin 125-HP drilling outfits. In Fig. 6 is shown the extreme low, No. 1, and the extreme high, No. 8. There are 6 intermediate speeds between these two. With the shift position to drive jack, line and drum shafts in low we have a fast line speed of 152 feet per minute and with the 3 shafts in high a fast line speed of 2700 feet per minute.

We believe these speeds are not only comparable but better than those obtained with any other type of drive and for a real surprise may we suggest that you actually time a round trip of one of these modern electrics with an adjoining steam outfit if the two holes are near the same depth.

If greater power and greater speed are necessary they can be obtained with electric service.

The electric drilling rig of today, either A. C. or D. C. can absolutely surpass the performance of any other power where given an equal chance.

We hear the statement occasionally that a large investment has to be made in a lot of expensive equipment. A comprehensive analysis and comparison of investment in electric and other types of power will show the contrary. What of it, if the electric costs real money initially, it starts to save operating cost from the beginning and continues to do so for the life of the equipment and the useful life is much longer than any other type of drive.

SPEEDS

TWIN MOTOR 250 H.P. DRILLING OUTFIT

— DRAW WORKS SPEED —		1	8
SHIFT POSITION TO DRIVE JACK SHAFT	-----	LOW	HIGH
" " " " LINE "	-----	LOW	HIGH
" " " " DRUM "	-----	LOW	HIGH
Fast Line Speed Feet per minute	-----	152	2700
— TRAVELING BLOCK SPEED —			
Feet per minute 6 Lines	----------	25	450
Minutes to Travel 88 feet	---------	3.52	.20
Feet per minute 8 Lines	----------	19	338
Minutes to Travel 88 feet	---------	4.63	.26
Feet per minute 12 Lines	----------	13	225
Minutes to Travel 88 feet	---------	6.77	.39

Fig. 6

Harbor Drilling Ordinances Pass

Both the city of Long Beach and the Harbor Board have passed drilling ordinances, after some weeks of deliberations and postponements. As at present written, both bills are identical, and will become effective Nov. 11. The bills prohibit more than one well per acre; require a bond of $25,000 per well or $200,000 per lease; require a $750 permit fee, with an annual renewal fee of $150; require that surveys and other records shall be given to the Harbor Board. With operations opening on Nov. 11, probabilities are that the first well will be on production possibly by the end of the month.

In connection with the ordinance, the Harbor Board has asked its petroleum engineer for plats of all city-owned uplands, so that bids for drilling can be asked. The engineer was also ordered to select a location on the tidelands, so that drilling may be started there, the objective being to get the matter of the disputed ownership before the State Supreme Court as soon as possible.

Attacks On Depletion Allowance To Continue

According to the secretary of the American Mining Congress, J. D. Conover, who spoke at the recent annual meeting of the National Petroleum Association, there is every reason to believe that the national government will continue its attacks on the depletion allowance in the next session of congress. Mr. Conover said: "In view of past procedure, the mineral industries will probably have to sustain further attacks on the depletion deduction and particularly on percentage depletion, and during this short lull in legislative procedure, until the Congress meets in January, it behooves every mineral producer to do everything he can to place factual information before the members of Congress and the public on this subject. It is a difficult subject for men outside of the industries to comprehend, and the informed defenders of the rights of the mineral industries are all too few in the committees of the Congress."

Petrol Wilmington Line Nearing Completion

The Petrol Corp. will have its gathering line in the Wilmington area, consisting of about four miles of welded 6-inch pipe, in operation by approximately Oct. 25. The line ties in with the company's present line, as well as with its storage facilities at the harbor.

August Taxable Gasoline Sales 154,946,667 Gallons

Sales increase over July, and over August, 1936. Daily average sales for first eight months, 1937, 112,611.75 bbls.

With taxable sales of 154,946,667 gallons during August, California gasoline sales increased 2,408,241 gallons over the preceding month's sales, and 15,045,813 gallons over like sales for August, 1936, which totaled 139,045,813 gallons. August sales brought total taxable sales of gasoline in California to 1,148,895,635 gallons for the first eight months of the year. In barrels, California taxable gasoline sales have totaled 27,354,655.6 thus far this year, an increase of 1,887,275.94 bbls. over the 25,467,379.66-bbl. total for the first eight months of 1936.

Daily average sales for the period were 4,727,965.57 gallons in 1937, against 4,383,729.3 during 1936, an increase of 344,236.27 gallons per day during the present year. These totals in barrels were: 1937, 112,611.75 per day; 1936, 104,374.5 per day; daily increase, 8237.25 bbls.

Taxes assessed against August gallonage were $4,648,400.01, bringing the total for the first eight months of the year to $34,214,445.84, an average tax of $140,800.19 **per day** for **every day** of the first eight months of 1937. Approximately 10% of this tax will be refunded as having been levied against gasoline not used on the highways, but the remaining sum, $30,793,001.26, is still one which staggers the imagination.

Company Positions

Company sales positions showed relatively few changes, the biggest being Richfield's drop from fourth place in July to sixth place in August. August's 10 leading marketers, in order of taxable sales, were: Standard, Shell, Union, Associated, General Petroleum, Richfield, The Texas, Wilshire, Mohawk, and Hancock, while for July the line-up was: Standard, Shell, Union, Richfield, Associated, General Petroleum, The Texas, Wilshire, Mohawk, and Hancock. With total sales of 124,685,472 gallons in August, this group accounted for 80.47% of the total sales of the state, against 80.51% during July with a total of 122,830,482 gallons. The seven major companies sold 110,942,184 gallons, 71.6% of the total, during August, against 108,250,569 gallons, 70.96% of the total, during July.

In arriving at crude production levels, gasoline consumption is usually figured on a three-for-one basis—three barrels of crude to make one barrel of gasoline. On that basis, August demand for gasoline in California alone, not including offshore demand for gasoline made in California, required crude production of 357,021 bbls. per day, and for the first eight months of 1937 required an average of 337,836 bbls. of crude per day.

During August, 39 companies sold 300,000 or more gallons of taxable gasoline per day. These companies, in order of taxable sales, follow:

	Taxable Gallonage	Total Sales
Standard Oil Co.	29,389,788	79,065,180
Shell Oil Co.	19,030,375	33,176,310
Union Oil Co.	14,773,346	23,428,732
Associated Oil Co.	14,186,066	29,996,526
General Petroleum Corp.	13,088,350	31,863,283
Richfield Oil Corp.	11,776,752	15,974,193
The Texas Co.	8,697,507	11,136,607
Wilshire Oil Co.	7,157,649	7,164,720
Mohawk Petroleum Co.	3,604,329	3,743,640
Hancock Oil Co.	2,981,310	3,090,219
Macmillan Petroleum Corp.	2,552,778	2,741,229
The Caminol Co.	2,295,110	2,316,872
Pacific States Oil Terminals	2,277,284	2,268,600
Estado Petroleum Corp.	1,642,881	1,642,881
The Norwalk Co.	1,540,724	2,223,233
Exeter Refining Co.	1,412,143	1,412,173
Olympic Refining Co.	1,404,660	1,406,376
Seaside Oil Co.	1,379,729	3,585,335
R. R. Bush Oil Co.	1,137,142	1,383,574
The Petrol Corp.	1,047,851	2,743,430
St. Helens Petroleum Co.	1,037,527	1,059,210
Rothschild Oil Co.	988,924	988,924
Socal Oil & Refining Co.	918,742	919,522
Envoy Petroleum Co.	884,993	884,993
M. M. McCallen	855,113	1,068,621
Bachmann Petroleum Corp.	839,061	1,002,873
Edington Oil & Refining Co.	827,633	827,633
Operators Oil & Refining Co.	775,640	775,629
Kreiger Oil Co.	702,745	713,082
El Tejon Refining Co.	677,914	717,538
Triangle Oil & Refining Co.	675,723	675,723
Los Nietos Producing & Refining Co.	600,131	3,177,968
Aromalene, Inc.	503,109	498,455
Elm Oil Co., Ltd.	440,180	440,180
El Camino Refining Co.	421,935	421,935
East West Refining Co.	380,685	455,732
J. O. Moffett	359,060	359,072
Harbor Refining Co.	342,862	390,593
Mercury Petroleum Co.	333,497	333,497
All others	1,005,419	.....
Total August	**154,946,667**	**276,074,293**
Total July	152,538,426	
Increase	2,408,241	
Total to August 31, 1937	**1,148,895,635**	

BUDA
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H. R. Linhoff

The vice-president of the California Natural Gasoline Association is manager of natural gas and gasoline operations for Richfield Oil Corp., having been successively City Chemist for Pasadena, then with the General Petroleum Corp., Standard Oil Co., and Union Oil Co., before joining Richfield in 1923. His technical education was secured at the California Institute of Technology, from which he was graduated in 1920.

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October, 1937

This section, a regular monthly feature of the California Oil World, is devoted to the activities of the California Natural Gasoline Association. The California Oil World is the exclusive official publication of the California Natural Gasoline Association, so designated by vote of the Association Executive Committee in a meeting on August 19th, 1937

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Rapid Method For Low Temperature Fractionation Of Gases, Liquids, Vapors

Since the inception of the natural gasoline industry, many different procedures for the testing of natural gas and gasoline have been developed, used for a while, and then discarded in favor of newer procedures. These newer procedures either produced the same results at a lower cost, or in a simpler manner, or expressed the results in different units which enabled the plant engineer to better visualize what his equipment was doing. However, with the exception of the complicated procedure for the low temperature analysis of gas and gasoline, none of the simpler test methods have ever given direct results in terms of the ultimate composition of the material examined. This basic shortcoming of all field and plant test methods has made the interpretation of such empirical results largely a matter of individual opinion, or predicated upon individual conceptions of how the test method should interpret the operation of equipment. Standardization has done much to reduce indirect testing methods to orderly and well balanced procedures whereby the empirical results can be reproduced by different operators.

The direct analysis of natural gas and gasoline by low temperature fractional analysis, using liquid air, has been practiced for over ten years. The direct results obtainable have been of value to research and development and general plant engineering. On the other hand, low temperature analysis has always possessed the limiting factors of length of time required to complete a test; fragility; lack of portability; high initial cost; and high cost of operation. It has therefore been necessary to confine the apparatus to fixed locations, such as a field laboratory, and bring the samples to it. In bringing samples to the instrument another problem is frequently encountered in the form of difficulties in obtaining and transferring representative samples. These difficulties can be overcome, but involve a complicated and costly technique.

It is apparent then that the utility of the complicated low temperature analysis procedure has been largely limited to the analysis of occasional samples, or the analysis of samples for research, development or survey work. In spite of its usefulness the method has never been applied to the broad field of general plant and field testing, now covered by the charcoal test.

F. N. Laird

The author of this paper was educated at California Institute of Technology and U. S. C., graduating from the latter with an A. B. in chemistry. He was a laboratory tester for The Texas Company in 1930 and 1931, then was in charge of low temperature analysis work from 1932 until 1937, when he became laboratory foreman. He is chairman of C. N. G. A. Committee No. 2 on Fractional Distillation, and has read two papers before the Association. He has also completed several problems of an experimental nature in various phases of natural gasoline manufacture.

Three years ago the idea occurred to the writer that if low temperature analysis could be conducted in glass, then why not in metal? If the method could be made to work in metal, then why could it not be simplified through the elimination of many working parts necessary to the glass form? And further, could some other cooling agent be used which would replace the costly liquid air? If such an apparatus could be devised, could it be made to operate with an accuracy equal to the standard low temperature analysis procedure, and could it be small, lightweight and constructed with the ruggedness which would give portability?

A search revealed the possibility of designing an apparatus which would partially condense a gas sample, fractionate the portion lighter than isobutane as a lump, and retail all of the isobutane and heavier fractions. The possibility of determining propane seemed very promising also.

W. J. Murray has developed a formula for calculating the amount of any hydrocarbon which will condense under any pressure and temperature. It is:

$$C_l = \frac{LC}{100\frac{P_e}{P} + L\left(1-\frac{P_e}{P}\right)}$$

Where: C_l = mols of component in liquid after condensation.
C = mols of component in gas.
P_e = absolute vapor pressure of pure component at temperature of condensation.
P = total pressure on system.
L = total mols of liquid after condensation.

With this formula a series of calculations were made to find how much of each component will condense at —110°F (sublimation temperature of carbon dioxide), and pressure from 0 to 32 lbs. absolute. These calculations were carried out for propane, isobutane, butane, isopentane and pentane. Fig. No. 2 shows these data plotted when 20 mol per cent of the gas condenses at —110°F.

From Fig. No. 2 we can see that all of the isobutane and heavier is not condensed. But the curve shows clearly just how much is condensed. If the condensation took place at atmospheric pressure, Fig. No. 2 tells us that 66.5% of the propane will condense; 91.5% of the isobutane; 97.5% of the n-butane; 99.2% of the isopentane; and 99.5% of the n-pentane. All that is necessary then to obtain accurate results for the fractionation data obtained is to correct the amounts of each component found from the curves in Fig. No. 3, No. 4, and No. 5.

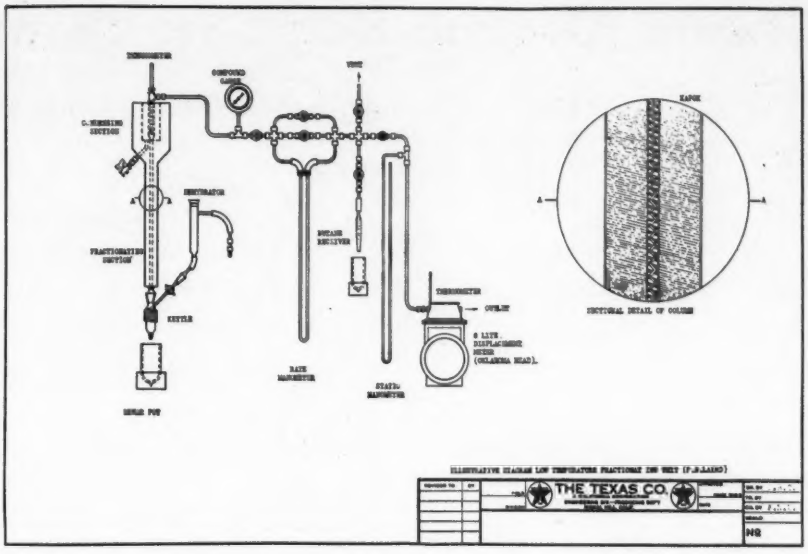
The gas unit designed to accomplish the condensation and fractionation of the gas is primarily a reproduction of standard fractionation apparatus in metal. All glass parts are eliminated except the kettle and butane condensation bulb. The final apparatus consists essentially of a gas dehydrating unit (1), graduated condensing and distilling kettle (2), fractionating column (3), condenser section (4), pressure gauge (5), rate control valve (6), and rate manometer (7), butane condensation bulb (8), displacement meter capable of measuring under vacuum (9), and a vacuum pump. All of these items are assembled of materials

lending ready portability to the completed unit. The dimensions of the various parts, in relation to one another, are very important if accurate results are to be obtained.

The following dimensions are the most suitable for the column when using an original condensed sample of between 1 and 8 ml for field testing and plant testing work. The fractionating section consists of an aluminum tube ⅜″ O. D. by 3/16″ I. D. and 26½″ long. The condensing section is 7/16″ O. D. by 11/32″ I. D. and 5¼″ long. The connection between the two tubes is a machined aluminum reducer which does not allow any liquid to be held up in the condenser section. The thermometer used to read the distillation temperature is of the ordinary cloud and pour point type, reading —70 to plus 70°F. The bulb is placed ½″ above the junction of the ⅜″ and 7/16″ tubing.

The fractionating section is housed in the center of a 2″ diameter tube of light weight aluminum tubing and is insulated with fairly tightly packed kapok in the intervening space. The condenser is made of 2″ diameter aluminum tubing inside 6″ diameter aluminum tubing and is insulated with kapok. The condenser section carries a drain cock (10) which facilitates changing the bath liquid.

A shorter column will give relatively poorer fractionation, while a longer one will proportionately lengthen the distillation time. The same is true for the condenser section. The use of aluminum tubing for the fractionating and condensing sections gives much better results than glass tubing because the heat transfer is faster and smoother. The breaks are therefore more distinct and uniform.



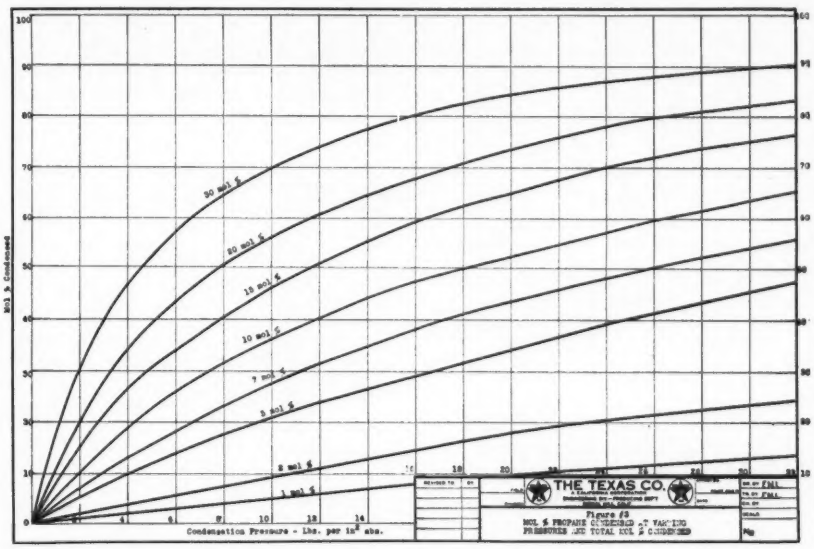
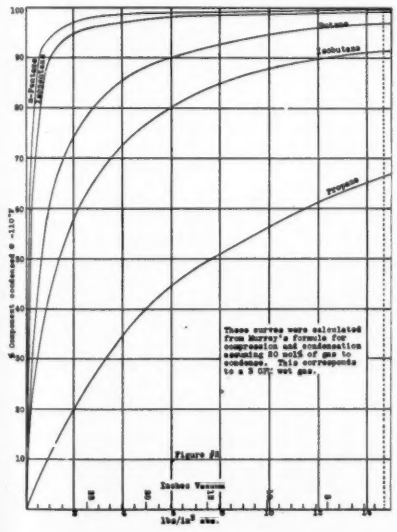


Figure #3
MOL % PROPANE CONDENSED AT VARYING PRESSURES AND TOTAL MOL % CONDENSED


Isobutane
Propane
These curves were calculated from Murray's formula for compression and condensation assuming 80 mols of gas to condense. This corresponds to a 5 GPM wet gas.
Figure #5
Lbs/in² abs.

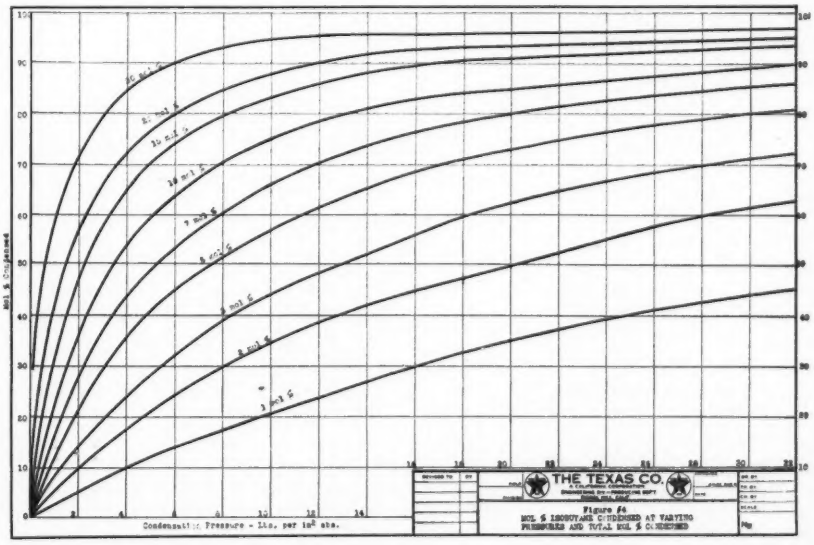
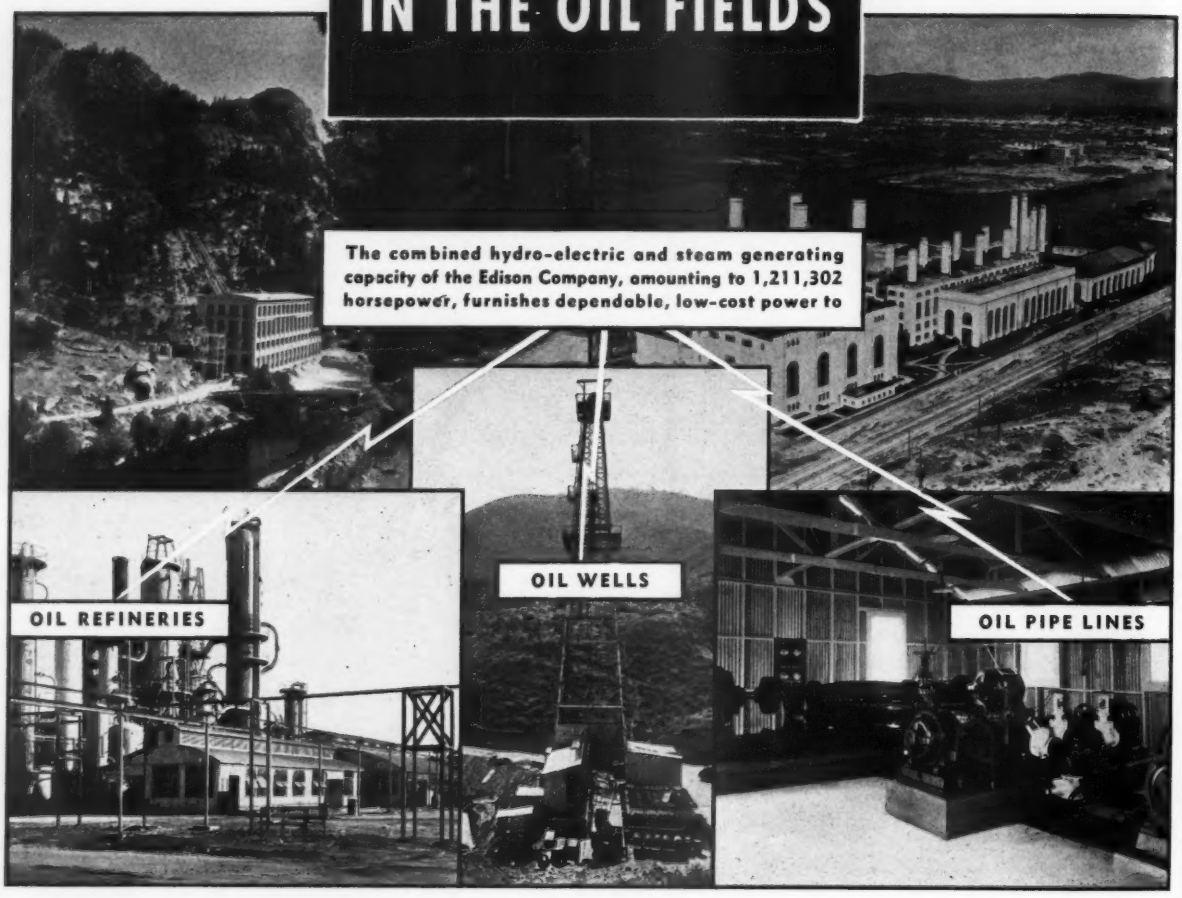


Figure #4
MOL % ISOBUTANE CONDENSED AT VARYING PRESSURES AND TOTAL MOL % CONDENSED

Electricity at work

IN THE OIL FIELDS


The combined hydro-electric and steam generating capacity of the Edison Company, amounting to 1,211,302 horsepower, furnishes dependable, low-cost power to
OIL REFINERIES
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A vast network of power lines extends from the Edison Company's generating plants to every section of its diversified service area. Electricity is available virtually everywhere that power is needed, —as readily at a well in the remote hills as at a refinery in a more thickly populated section.

Edison service engineers are experts in the application of electricity in field and refinery operations. They are qualified to show how dependable, efficient electricity can be of even more service to one of California's greatest industries. Their advice and counsel is available thru your nearest Edison office.

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10-37

By placing the thermometer as indicated above, the dead space in the condenser is reduced to a minimum and the accuracy of the analysis thereby increased. To further reduce the dead space, ⅛" O. D. copper tubing is used to connect the column to the rate control valve and pressure gauge.

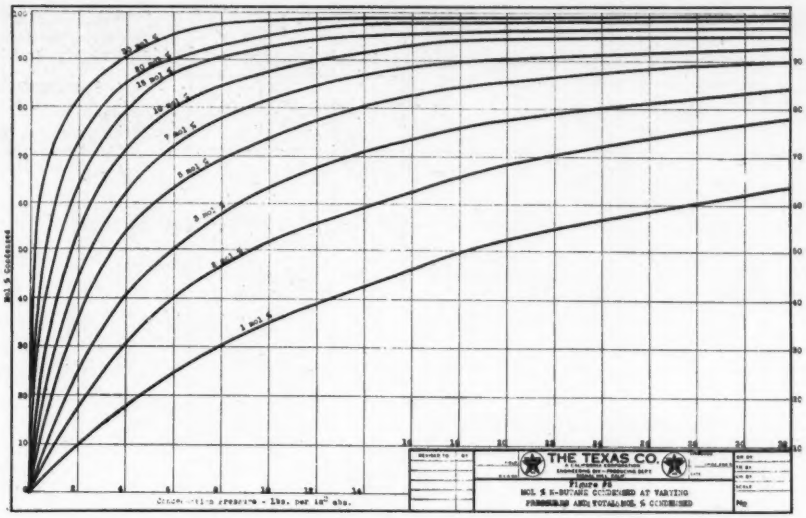
The fractionating column is packed with a double spiral of No. 22 ga. nichrome wire. The outside spiral is 8 turns to the inch and fits snugly against the ⅜" aluminum tubing, while the inside spiral is wound in an opposite direction 4 turns to the inch and fits loosely inside the outer spiral.

The kettle used varies in size with different samples. It is graduated in 0.1 ml up to 15 ml. The gas enters the kettle through a coil of 5 mm O. D. pyrex tubing wound about the main body of the kettle and entering it at about the 7 ml graduation. The coil has not less than 7 turns of 2" diameter.

All valves used are ⅛" needle valves and eliminate the use of glass stopcocks quite satisfactorily. The rate control manometer has two orifices and a valve so arranged that they may operate separately or together. This permits a large differential for slow distillation rates and also for rapid sample introduction rates at low differential by merely switching orifices.

The butane receiver is an ordinary 15-ml centifuge tube fitted up in a manner similar to a conventional condensation bulb.

The operation of the unit is quite similar to that of the standard glass column. Of course the column itself is not visible and so the glass column operator has some trouble (purely psychological) but after several runs gets along quite nicely. The average field tester unused to handling the standard glass column, frequently acquires skill faster in manipulating the modified metal column than experienced laboratory men who have worked with only glass columns.



The following results were obtained by field testers after witnessing one run by an experienced operator; and illustrate the reproducibility of results to be expected. Note how operator A (the experienced operator) checked himself.

TABLE NO. 1

Operator	A	B	C	D	A
ic_4 plus	4.366	4.257	4.116	4.261	4.310
nc_4 plus	3.630	3.533	3.463	3.511	3.593
ic_5 plus	1.911	1.962	2.092	1.947	1.945

How do the results obtained by modified composition analysis compare with those obtained by standard low temperature fractionation? After the unit was completed along the lines described above, an exhaustive series of analysis were made on samples taken simultaneously, first with the modified composition analysis unit and then by standard low temperature fractionation according to C. N. G. A. Bulletin TS-321.

When this comparison was first begun the modified composition analyses were consistently higher in isopentane-plus than the standard analyses. In order to check this difference all samples were taken directly in a C. N. G. A. gas kettle at the sample source, transported to the laboratory in liquid air and analyzed by the conventional C. N. G. A. method

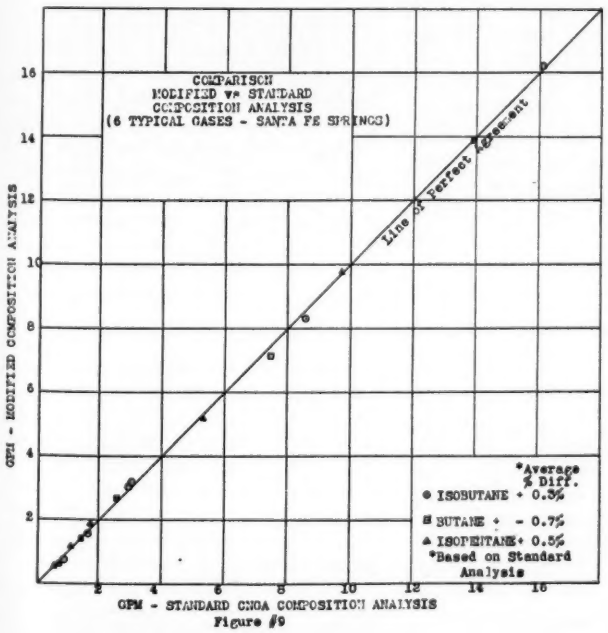


Figure #9

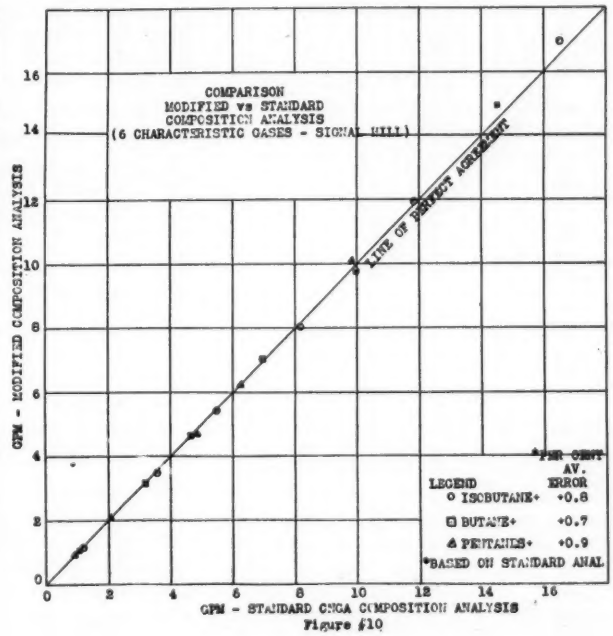


Figure #10

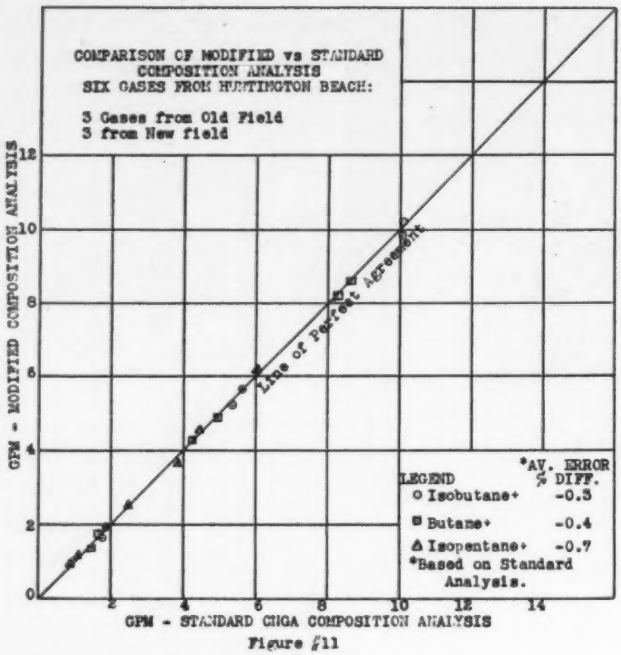


Figure #11

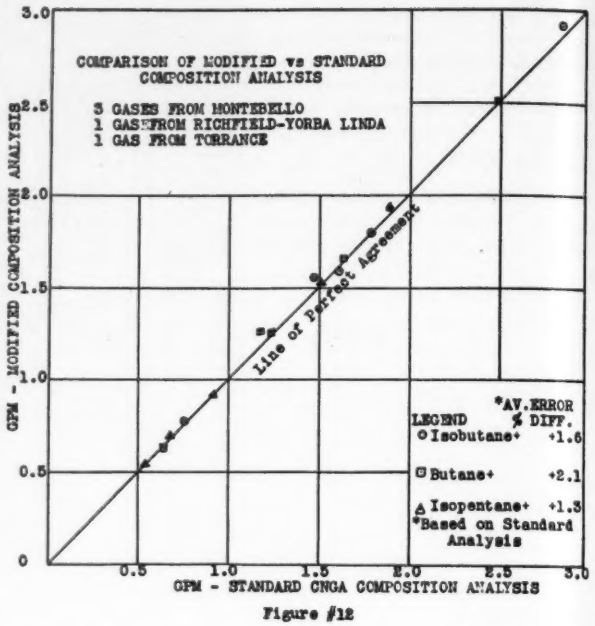


Figure #12

using the method described by Robinson and Laird (2) for determining the isopentane-plus fraction. After these precautions were taken the results checked well.

Curves in Figs. No. 9, 10, 11 and 12 show how closely the modified composition analysis column results check those obtained by the standard C. N. G. A. apparatus. These curves also show that modified composition analysis will work on all gases found in the Los Angeles Basin, from the leanest to the richest, no matter what the composition. There is also every reason to expect that the duplicability will hold for other districts as well.

At this point is is interesting to note the application of the apparatus to a gas which can give confusing results by the charcoal test. The composition follows:

Air	0.11
Carbon dioxide	0.30
Methane	89.40
Ethane	1.06
Propane	1.67
Butanes	2.40
Ipsopentane (plus)	5.06

From the analysis it is seen that the methane percentage is high, ethane very low, propane almost twice as high as ethane, butanes higher than propane and isopentane-plus much higher than butanes. According to a theory of temperature rises in a charcoal tube, this would be a hard gas to run, because the propane would saturate the tube ahead of the ethane, the butanes ahead of propane, and the fourth rise would mean nothing since butane would be lost before the fourth rise. In actual practice with this type of gas, it is hard to tell where the fourth rise actually occurs, because it seems to come almost on top of the third. (Fig. No. 13.) Modified composition analysis runs higher than the 30-lb.-32° charcoal test on this gas which would indicate that some butanes are lost in saturating the tube to an estimated fourth rise. The field tester has no way of knowing this. With modified composition analysis it makes no difference what the composition of the gas might be, since no set amount of gas is used.

For plant work the unit works well on all gases, vapors and liquids. One unit can survey a complete plant in from eight to twenty-four hours. The results are comparable to composition analysis and obtained much quicker and cheaper. Comparative results on plant samples are as follows:

	Rectifier Vent Vapors MCA	CA
Isobutane plus	8.442 GPM	8.323 GPM
N-butane plus	2.477 GPM	2.281 GPM
Iopentane plus	Trace GPM	0.037 GPM

This type of sample is most difficult to analyze and takes from 20 to 36 hours on a C.N.G.A. standard column. With the modified column it required but three hours and three to four pounds of dry ice.

	Finished Product MCA	CA
Isobutane	2.39%	2.24%
N-butane	24.08%	25.25%
Isopentane +	73.53%	72.51%

This sample takes about 2½ hours by MCA and 24 hours by CA.

	Dry Gas MCA	CA
Isobutane plus	0.236 GPM	0.248 GPM
Butane plus	0.098 GPM	0.091 GPM
Isopentane plus	0.019 GPM	0.016 GPM

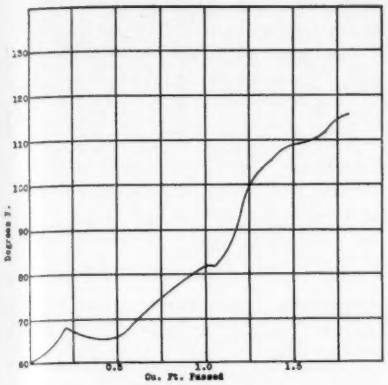
This sample takes about 3½ hours by MCA and 24 hours by CA.

The problem of taking, transporting and transferring samples is solved by taking the sample directly into the apparatus. The only contact made by the sample between the sample source and the column is its passage through a drier between the line and the apparatus. Flexible metal tubing is used for a sample introduction line, in order to get away from the absorption of hydrocarbons by the rubber on ordinary tubing. Where flexible connections are necessary in the apparatus itself Duprene tubing is used.

What does it cost to build a modified composition analysis apparatus; how does the time required for an analysis with it compare with standard low temperature analysis; and what is the cost, per analysis, in comparison to standard low temperature analysis?

A complete modified composition analysis unit can be assembled for between $100 to $200, the price depending on how fancy and complete the unit is to be

(2)C. N. G. A. proceedings Oct., 1933.



Air	0.11
Carbon dioxide	0.30
Methane	89.40
Ethane	1.06
Propane	1.47
Butanes	2.40
Isopentane+	5.06

Fig. #13

built. This price is a rough estimate based on our construction of one unit for our use.

An analysis of the time required to complete an analysis with modified composition analysis as compared with standard composition analysis shows an average of 1½ to 3 hours for MCA against 6 to 24 hours for CA.

The average modified composition analysis costs about 5 to 10c for materials against $3.50 for standard composition analysis.

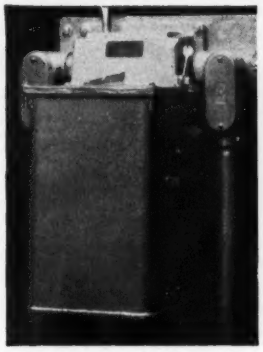
Before concluding, the author desires to express his appreciation to C. F. Braun & Co. for building the apparatus, and to the faculty at U. S. C. for suggestions and encouragement.

In conclusion it is well to emphasize that this apparatus is not presented as a cure-all for plant and field use. It has its limitations. But it is believed that careful investigation will reveal it to be an instrument which is cheap to build; possesses a ruggedness and portability wholly satisfactory for rough field use; gives results in a much shorter time, and more economically, than the present standard low temperature fractionation method; gives results which agree to within 1% with those obtainable by standard low temperature fractionation; and finally introduces a complete instrument for the direct analysis of gases, vapors and liquids which can be readily handled by men unskilled in complicated laboratory procedures.

Ohio Oil Moving Absorption Plant

Operations involving the removal of the Ohio Oil Co. absorption plant and compressor station from its present site at Venice, Calif., to a new location in El Segundo are under way. Parkhill-Wade of Los Angeles are in charge of the work.

New Immersed Low Voltage Line Starters



New Westinghouse totally oil immersed linestarters known as low voltage type DNO, explosion-proof and corrosion-resisting service, are designed for starting squirrel cage motors in oil refineries, chemical plants, paper mills, coke plants, cement mills, and in similar applications where either corrosive or explosive gases may be present.

The combination starters provide in one oil tank, complete corrosion-resisting motor control, motor disconnect switch and circuit protective device. Explosion-proof starters conform to the Underwriters' Laboratories specifications for apparatus for installation in Class I Group D hazardous locations as defined in Article 32 of the National Electrical Code.

The linestarters are of weather-proof, drip-proof, splash-proof, dust tight construction with cast iron top casting and heavy sheet steel tank with gasketed joint. They are designed for wall or frame mounting, wtih tapped holes for conduits on top. Ends and back of top casting may be tapped for conduit.

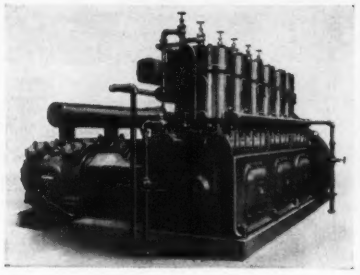
Overload protection is provided by two thermal induction oil-immersed automatic reset overload relays.

Low voltage protection is obtained with three-wire push button control.

Complete safety is assured by interlocking breaker handle with the tank so that the latter cannot be lowered unless the breaker handle is in the "off" position. Furthermore, the breaker cannot be closed with tank lowered unless the interlock is deliberately tripped.

In addition to the breaker and starter combination unit described above, there is also available a combination unit with non-automatic disconnect switch and a plain starter without disconnect.

Worthington Offers New Compressor



To meet the demand for a medium size, self-powered, simple and compact air and gas compressor unit which is applicable to the special processing needs of refineries and natural gasoline plants, as well as for gas transportation lines, gas or air-lift pumping, refrigeration and general compressor services, a modern line of four-cycle angle-type gas engine compressors has been developed by Worthington Pump and Machinery Corp., Harrison, New Jersey. Combining ruggedness and portability, these type LCE units occupy little space and, although designed for permanent heavy-duty work, are adaptable for locations which may not be permanent.

They are built with one to four compressor cylinders, corresponding to 75 to 300 h.p.; all compressor cylinders are horizontal and at right angles to the power cylinders. Each compressor cylinder has two corresponding power cylinders and the compressor element can be arranged to deliver any combination of volume and pressure within the limits of the engine rating. With this flexibility, it is possible to meet service conditions for any situation.

The compressor cylinders are of the standard Worthington design and are fitted throughout with light-weight feather valves. Other features of the compressor include large water jackets and close clearances, all of which, it is said, combine to give high volumetric efficiencies.

The engine is a vertical, four-cycle type, with power cylinders, valves and working parts small in comparison with the slower speed horizontal type of similar horsepower. Extremely large water jackets with clean-out plates have been provided.

Of particular importance is the fact that, regardless of engine-compressor size, most parts are interchangeable. This feature eliminates the necessity for carrying a large stock of spares on hand.

Record Attendance Expected For C. N. G. A. Fall Meeting

rospects for a record-breaking attendance at the annual convention of the California Natural Gasoline Association lead officials of the organization to estimate that more than 750 will be present at the meeting when it is called to order Nov. 18 at the Ambassador Hotel in Los Angeles.

The highlight of the C.N.G.A. year, the annual meeting is held to promote knowledge of the natural gasoline industry, and to serve as a forum for the presentation and discussion of new ideas bearing on the field.

In urging all those who possibly can to attend, program chairman Doug. Balthis of the Natural Gas Equipment Co., pointed out that "This year we have one of the finest set-ups for the meeting that could be obtained." The all-day affair will be divided into a morning, afternoon, and banquet session.

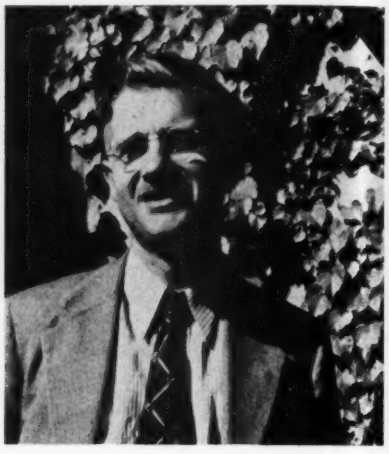
Dr. Lester C. Uren, professor of petroleum engineering at the University of California, will be the featured speaker of the day. Dr. Uren, known as an authority on petroleum engineering, will present "A Discussion of Present Trends and Future Prospects of the Natural Gas Industry in California."

With registration of delegates scheduled throughout the day, the morning session, under the chairmanship of C. D. Gard,

T. R. Beauchamp

Union Oil Co., and technical chairman of the C.N.G.A., will get under way at 9 o'clock. Devoted entirely to technical discussions, this part of the program will be given over to the presentation of papers by the chairmen of the technical committees of the organization. The papers, and the men who will present them, are: "Metering of Gasoline by Positive Displacement", T. R. Beauchamp, The Texas Co. "Truck Gauging", Warren Kraft, Honolulu Oil Corp. "Physical Constants", D. A. Smith, Associated Oil Co. "Liquefied Gas", C. L. McCartney, Petrolane Corp.

Adjourning for an informal luncheon meeting, members will reconvene to hear Dr. Uren's address on the present trends and future prospects of the industry. Mr. Uren will be followed by Henry



D. A. Smith

Wade, of the Parkhill-Wade Co. and the Stearns-Rogers Co., who will speak on "Polymerization", a topic made doubly interesting by the fact that Mr. Wade has spent much of the past year in actual construction work, and thus can bring the convention the latest information on modern methods in use in this process.

The session will close with a banquet in the evening, devoted entirely to entertainment. J. C. Burks, of the O. C. Field Gasoline Corp. and president of the C. N. G. A., will preside.

Chas. E. McCartney

B. D. Balthis

Corfield Speaker At Taft C. N. G. A.

The presence, in any amount, of hydrogen sulphide, CO_2 and sulfur compounds, presents a serious problem in the natural gas and gasoline business. Guy Corfield of the Southern California Gas Co., speaker at the October meeting of the Taft Chapter of the C.N.G.A., discussed this problem under the title "Treatment of Gases to Remove Hydrogen Sulphide, CO_2 and Sulfur Compounds."

Raymond Grey of the Taft Lumber Co., who recently traveled around the world, spoke on the part of his trip in the Orient.

RICHFIELD OIL CORPORATION
OHIO OIL CO
Susan Gough
GEO F GETTY INC. (E S)
O.T. Johnson Corp. (18 Acres)
RICHFIELD OIL CORP (Intercity Land Co.)
PAC. WESTERN OIL CO (Goodwin)
PAC. WESTERN OIL CO.
RICHFIELD OIL CORP (Howard)
PAC. FACTORS INC
ROYALTY SERV CORP (Buffington)
ROYALTY SERVICE CORP (Johnson)
PACIFIC WESTERN OIL CO
(Woods)
L B MARVIN
REPUBLIC OIL CO
FAULT
CAMINOL OIL CORP
WILSHIRE OIL CO
REPUBLIC OIL CO (El Segundo)
ZONE
RICHFIELD OIL CORPORATION (El Segundo)
UNION OIL COMPANY (El Segundo)
UNION OIL CO
RICHFIELD OIL CORP (AT&SF)
UNION OIL COMPANY (El Segundo)
UNION OIL COMPANY (UNION OIL LAND CO)
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9250
9300
9350
9400
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Field Development

Los Angeles Basin

El Segundo Undergoing Regular Drilling Boom

Two years and two months ago—Aug. 24, 1935—the Republic Petroleum Corp. completed the first El Segundo well, thereby discovering a new field. But like another great Southern California field, Santa Fe Springs, development was slow at first, gradually gaining momentum until at the present time it has attained the proportions of a major drilling boom. The present high rate of activity is due to the fact that only recently have the proven limits been extended to include the town lot area to the northwest of the early wells. With good completions by Richfield and Sunshine as an incentive, operators are pressing work with a fervor reminiscent of the heyday of the booming twenties and more recently of the townlot activity of Wilmington, a recent check showing 20 wells drilling or preparing to spud and many locations upon which work will soon start.

On the refinery site in the west part of the field, Standard Oil completed No. 2 from 7417 ft. for an initial of 4417 bbls. of 25.3 gravity clean oil. The top of the conglomerate is at 7213 ft. and the top of the schist at 7267 ft. A drill pipe test of the schist was made with packer set at 7367 ft. and hole open to bottom, which indicated that the basement here is capable of substantial production. Refinery No. 3, completed more than two weeks ago, is holding up very well at 3037 bbls. per day, No. 4 is drilling below 4700 ft., No. 5 has spudded and No. 6 is a foundation.

Gough No. 7 of the Ohio Oil Co. was brought in as a 400-bbl. producer offsetting the townlot development; No. 8, offsetting the Getty well, is coring for the top of the conglomerate and No. 9 has been spudded as another townlot offset.

Richfield's northerly outpost, Santa Fe B-1, is drilling at 3300 ft. and Howard No. 1, northeasterly test well, cemented 7-in. at 7437 ft., 13 ft. above the top of the conglomerate, and is running a liner to bottom at 7494 ft. Fear of encountering edge water has prompted the company to stop short of the schist, the hole being bottomed in the conglomerate.

The most easterly well, Tidewater Associated Leuzinger No. 1, has started coring, the bottom now being below 7000 ft.

The Texas Co. at present is active on only one project, Security No. 5, which is drilling below 6000 ft.

The field's most southwesterly well, Union Oil El Segundo No. 3, was brought in on the pump, making 95 bbls. of 18.1 gravity oil cutting 2.4%. Production is from 60 ft. of fairly fine grained oil sand to bottom at 7520 ft.

Operators in the northwest extension are the Apex Petroleum Co., which is drilling Elsie No. 1 at 5300 ft.; Howard Oil Co., which will drill the northwest corner of Magnolia and Washington; Lakeside Oil Co. with a rig up at Holly and Kansas; Richfield Oil Co., with McCray No. 1 drilling below 4300 ft., and No. 2 preparing to start; Ruchti Petroleum with No. 1 approaching 5000 ft.; Government Refining & Gasoline Co. with work starting on four new locations and the Wilshire Oil Co., which has rigs up for two wells.

Loose Sand Delays Yorba Linda Completion

Completion of the Midstate Oil Co. Oliver No. 1 at Yorba Linda has been delayed by the looseness of the oil sand which enters the hole almost as fast as it can be bailed out. The oil appears to be clean and approximately 100 bbls. per day are recovered incidental to the bailing.

Operators Hjorth & Mohr carried Behrns No. 1 to a depth of 1373 ft. where on a production test the well pumped only water. The bottom has been plugged to 1345ft. after water was located on bottom.

New entrants in the field are Oil Income Corp., headed by Dr. Frederick A. Speik, and J. Pearl Oil Co., which will soon be under way.

Completions Fewer At Wilmington

Completions in Wilmington are becoming fewer, reflecting the declining rate of new wells started. Union Pacific maintained its dominating position by completing six wells in the upper Terminal and Ranger zones with an average of approximately 600 bbls. per well while the General Petroleum Corp. obtained the largest single well in Ford No. 22, which came in for 1980 bbls. per day of 29.1 gravity oil cutting 2.4% from the lower Terminal zone.

The Caminol Co. completed Paye Community No. 1 at 3600 ft. for an estimated 300 bbls. but has had considerable sand trouble and has not as yet put the well on steady production.

F. C. Hall obtained a fair well in Villa-Hall No. 1, which was brought in from 3600 ft. making 200 bbls. of 15.1 gravity clean oil. Both wells are located in the northern section of the field.

Drilling activity is now about evenly divided between the major operators represented by U. P., G. P. and Bankline in the easterly section, and the independents operating in the northwesterly area. Deep zone possibilities in the townlot area will be further tested in Royalty Service-Gilmore 842-2 as the plug has been cleaned out from 5380 ft. to bottom at 5775 ft. and a new plug set at 5747 ft. An aluminum-topped liner was landed and cemented through perforations at 5674 ft. and at last reports the well was showing but little "kick" while being swabbed with fluid at 1000 ft.

While several operators have announced intentions of going deep, Pacific Western's Ronan Community No. 1, now deepening below 3700 ft., is the only townlot well approaching interesting depths.

Long Beach Area In Leasing Boom

With the opening of the Long Beach area definitely scheduled for the middle of November, operators who have not yet entered the field are starting a last minute scramble for leases. As practically all the larger pieces have been tied up for some months, the activity is of necessity in the subdivided sectors where lot owners are demanding, and getting, as high as $500 per lot bonus, 20% royalty and short term drilling clauses. It is understood that the more desirable of the large tracts have been leased to major operators on a sliding scale royalty basis, the landowner's percentage varying according to production from 16 2/3 to 30%. The results of geophysical surveys and the knowledge gained from drilling in the Wilmington area have led operators to believe that production will extend at least to Anaheim Blvd. on the north, the flood control channel on the east, and to the ocean on the south, with the preferred area lying south and west of Seventh St. and Pico Ave.

British American Oil To Drill Near Pico

The British American Oil Producing Co., a subsidiary of British American Oil, Ltd., of Toronto, Canada, operating in Mid-Continent fields, has entered California with the starting of a wildcat near the town of Pico. Besides thoroughly checking the surface geology, the company has made an exhaustive geophysical study of the area over the past several months. The first well will be drilled on leases taken by the Honolulu Oil Corp. and turned to British American on a division of acreage basis. As this is the first test between Montebello and Whittier located according to geophysical findings, it will be watched with unusual interest by the oil fraternity. Mechanical aspects of the drilling are also of interest as contractors Bell & Loffland have installed the latest butane powered equipment.

Two Producers Near In L. B. Extension

The Long Beach extension area will soon have two more producers as the Hilldon Oil Co. and Union Oil Co. each prepare to drill in and complete a well. The Hilldon Flood Control No. 3, located about 600 ft. north of production, encountered the sand higher than any well yet drilled and cemented the water string at 3969 ft. Bottom of the hole is slightly below 4000 ft. and it is probable that more formation will be opened before completing.

Union Oil's Oil Operators No. 1 cored the sand at 4106 ft. and with bottom at 4110 set 9-in. casing at 4105. Cores in both wells look very good and each should equal the 500-bbl. settled production set by the Hilldon Amebco Nos. 1 and 2.

John Abrams and associates are erecting derrick for their first well on leases taken from Hilldon. The location is approximately 300 ft. south of and offsetting the second good completion, Amebco No. 2.

The Richfield Oil Corp. will soon enter the area with another well on the old Bixby lease to the south and across the tracks to the east. During the Los Cerritos boom of more than a decade ago, the United Oil Co., later absorbed by Richfield, obtained good production from this property.

Test Of Anaheim Well Wet; Drilling Continues

The Anaheim wildcat of the Shell Oil Co., Harbeson No. 1, picked up stringers of oil sand and gray sand at 6875 ft., cored ahead to 6995 ft. and landed formation tester packer at 6940 ft. As was feared from inspection of the cores, the gray sand carried water and the drill stem test recovered only mud and brackish water with occasional globules of oil. The well is now being deepened below 7150 ft. in the same formations.

San Joaquin Valley

Superior Completes KCL 9 On Gas Lift

A production test of more than usual interest was recently made by the Superior Oil Co. in KCL No. 9, sec. 3, 30-26, three miles southeast of the Greeley area developed by the Standard Oil Co. Drilled to 7870 ft., 7-in. casing was cemented on bottom and gun perforated between 7558 ft. and 7580 ft. When swabbed on Oct. 14, the well started flowing at an 850-bbl. rate for the first few hours but soon slowed down, actually putting 415 bbls. in the tanks on a 24-hour gauge. On Saturday, Oct. 16, pressures fell off and the flow stopped entirely. The oil is of 32 gravity with a water cut of 4%.

Efforts to make the well flow did not meet with success and it has been completed on the gas lift with no estimate of production. The producing sand in this well, although cored at a more shallow depth, is stratigraphically lower than the productive horizon in Greeley, which in this locality is apparently barren.

Shell Completes 10 Sections Well

In its own private oil field, Ten Sections, the Shell Oil Co. has brought in another excellent producer in KCL B-61, sec. 31, 30-26. Seven-inch casing was used to shut off water at 7931 ft. and 4¾-in. liner was landed six feet off bottom at 8235 ft. Perforated from 7978-8185 ft. and 8205-8235 ft., the suspiciously gray zone at 8200 ft. was blanked off. Two and one-half-inch tubing was run to 7894 ft. and the well completed Oct. 16, establishing a potential of 2656 bbls. per day (net) of 35.6 gravity oil cutting 6.4% and 2170 mcf gas. A 13/64 bean is now installed, reducing the production rate to 535 bbls. per day cutting 0.7% with 340 mcf gas. Flow pressure has increased from 150 lbs. to 1175 lbs. and casing pressure has built up to 1630 lbs. from 400 lbs.

Fruitvale Production To Be Extended North

Indicating that production at Fruitvale will soon be extended north into sec. 14, 29-27, Western Gulf Oil Co. B-28 cored the top of the Fairhaven sand at 3020 ft. Water string was set at 3019 ft. and the well is now being cored ahead to determine the extent of the zone.

Western Gulf's southerly outpost, Red Ribbon No. 9 in sec. 27, is being completed at 3525 ft. with 70 ft. of sand opened below the shoe of the 8⅝-in. casing. Location for Red Ribbon No. 10 has been staked 280 ft. south and 990 ft. west from the east quarter corner of the section.

Meridian Oil Co. completed No. 6 on the Turner Property in sec. 23 with initial production of 185 bbls. per day, 17.5 gravity and cut of 7.0%.

Kenda, Continental Have Deepest Wildcat Wells

Deepest of California wildcats now active are Continental Oil Co.'s KCL A-2 at Wasco which is now coring in hard shale below 11,566 ft. and Kenda's deep Kettleman test, 4-18J, now at 11,503 ft. in barren sand. Neither well improves with depth and the probabilities are that the unusual depth attained will be the Continental's only claim to fame, while 4-18J will always be known as the discoverer of Kettleman Eocene production.

Ohio Rumored To Plan New Well At Tejon

Persistent rumors are in circulation to the effect that the Ohio Oil Co. will in the very near future start work on another test of the Tejon Ranch. Advices from Bakersfield indicate the well will be known as T.I.T. D-2 and will be located in the sw¼ sec. 23, 11-19, a mile and a half east of Ohio's recently abandoned T.I.T. No. D-1 in sec. 21.

Union Kernco 34-1 Cores Oil At 11,240

Four miles northwest of the Greeley field, the Union Oil Co. Kernco 34-1, located in sec. 34, 28-25, has cored a fairly solid body of oil sand, which corresponds to the Vedder zone, from 11,240 ft. to bottom at 11,302 ft. The sand appears to be well saturated and expectations are that good production will be obtained. The company has ordered an aluminum liner to be set on bottom and cemented through perforations above the zone to be tested.

Should this well live up to predictions, the Union Oil Co. will have given to California one of the world's deepest oil fields and much credit will be due to every man who has had a part in the success.

G. P. Belridge Well Sticks Pipe At 1120

St. Helens No. 1, in which the General Petroleum Corp. hopes to extend the North Belridge producing area a mile to the south, has run into unexpected difficulties in high gas pressures and sluffing shales at shallow depths. After drilling had reached 1307 ft. it was thought advisable to case off the high pressure gas and 22-in. casing was started in the hole, but caving shales stuck the pipe at 1120 ft. Drilling has now been resumed with the intention of carrying the hole to the Wagon Wheel zone which is expected in the vicinity of 8000 ft.

Pure Oil Makes Progress In Well Near Coalinga

East of the Coalinga fields in sec. 31, 18-17, the Pure Oil Co. is making rapid progress in an exploratory well located on Southern Pacific Land Co. property. Spudded only last month this well is now coring below 6200 ft. No showings have yet been reported.

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Ring Adds Two New Mt. Poso Producers

The Ring Oil Co. has added two more producers to its Mt. Poso string with the completion of Shapiro No. 2 in sec. 32, 26-28 and Bowles No. 4 in sec. 29. Bottomed at 1725 ft. after coring 65 ft. of Vedder zone, the Shapiro well was pumped in for 350 bbls. of clean oil. Bowles No. 4 was brought in from 1744 ft. with initial production of 370 bbls. from a 54-ft. Vedder penetration.

In sec. 21, 26-28 the Sunset Oil completed two 100-bbl. pumpers in Bowles No. 3 and Vedder No. 4. The former topped the zone at 1525 ft. and completed from 1592 ft. while Vedder No. 4 cored the sand from 1485 ft. to bottom at 1510 ft. Vedder No. 5 with 8⅝-in. casing now standing cemented at 1540 ft., will be Sunset's next completion.

Dwight Vedder was successful in completing BNB No. 2 from 1703 ft. for more than 400 bbls. of clean oil and is now drilling BNB No. 3. Both wells are located in the ne¼ sec. 32, 26-28.

The Vedder Pet. Co. Lambert No. 2 in sec. 29, 26-28, in which production was running 60% water, has been taken off the pump to plug bottom.

Central, Northern Parts Of State Get Wildcats

The search for commercial oil and gas production in the central and northern parts of the state becomes more intense with the announcements of several new exploratory wells. In the Los Banos area of Merced county the Amerada Petroleum Co. is drilling a test for oil on the Carano property in sec. 19, 10s-11e. The Standard Oil Co. is drilling below 4800 ft. in Weyl-Zuckerman No. 1 in sec. 25, 2n-4e in the Stockton gas district and the Central Valley Oil Co. has made a location for a test well to be drilled in the ne¼ of sec. 1, 12s-20e in the Clovis area.

Standard Trico Well Drilling Below 9100

In the Trico area of Tulare county, the Standard Oil Co. is drilling the H. C. Morris well, sec. 36, 24-23, below 9100 ft. As the company will give out no information on this test very little is known of the formations encountered. In the same district, the Magnet Oil Co. is drilling Amalgamated Oil & Gas No. 3, sec. 29, 24-24, in brown shale at 7400 ft. and the Trico Oil & Gas Co., in sec. 28, 24-23, is rigging up to spud Bryson No. 1.

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Mohawk Completes Mountain View Well

Mohawk Petroleum Co. has completed Earl Fruit No. 4 in the southerly "hot spot" at Mountain View with initial production of 425 bbls. per day. No production was obtained when the well was originally drilled to 5778 ft. and it was necessary to plug almost to the grass roots and employ directional drilling methods to get the hole across to the productive side of the fault. New hole was made to 5450 ft. and the well completed in the interval 5263-5450 ft. Settled production is now 375 bbls. of clean 28 gravity oil.

Monterey Edison Well Making 70 Bbls. Daily

In the center of Edison, Monterey Exploration Co. has completed Nichols No. 2 from 1805 ft. for 70 bbls. of 16.1 gravity oil cutting 8.6%. The top of the Upper Duff zone was reached at 1758 ft.

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Standard Oil Plugs KCL 12-2 To 7640

In the Greeley field proper, the Standard's KCL 12-2, northeasterly outpost well in sec. 16, 29-26, was deepened to 7711 ft. but encountered only water sands below the oil zone tested from 7600-7631 ft. Hole was plugged to 7640 ft. and a perforated liner landed at that depth.

In an attempt to extend the limits of production a half mile to the north of No. 12-2, the Standard is preparing to drill 17-1 in sec. 9, 29-26. It is hoped that this well will throw a little much needed light on the form and trend of the structure here.

Fleishauer Comm. No. 1, a southerly test of the main producing area in sec. 20, 29-26, is nearing 7600 ft. in depth and should soon pick up the oil sand. Farther north in the same section, No. 11-9 is coring for the oil sand below 7620 ft.

Westbrook Coring Streaks Of Oil Sand

The Westbrook Co. No. 1 in sec. 4, 30-29 is reported coring streaks of sand which give good cuts at 1775 ft.

STATEMENT OF OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, and MARCH 3, 1933.

Of California Oil World & Petroleum Industry, published semi-monthly at Los Angeles, California, for October 1, 1937.

State of California, County of Los Angeles, ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Walter C. Monroe, who, having been duly sworn according to law, deposes and says that he is the Publisher of the California Oil World & Petroleum Industry, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Walter C. Monroe, 178 S. Detroit Street, Los Angeles, Calif. Editor, Stark Fox, 1124 Oak Grove Drive, Los Angeles, Calif. Managing Editor, None. Business Manager, Walter C. Monroe, 178 S. Detroit St., Los Angeles, Calif.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member must be given): Petroleum Publishers, Inc., 714 W. Olympic Blvd., Los Angeles, California; A. A. MacDonald, 133 N. Las Palmas; Ward B. Blodget, 342 Pet. Sec. Bldg.; M. K. Miller, Jr., 650 S. Spring St.; Arnold K. Fitger, 530 W. 6th St.; Walter C. Monroe, 178 S. Detroit St. All the above are Los Angeles, Calif., addresses.

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5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above is: (This information is required from daily publications only.)

WALTER C. MONROE, Business Manager.

Sworn to and subscribed before me this 24th day of September, 1937.

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(My commission expires Nov. 9, 1939.)

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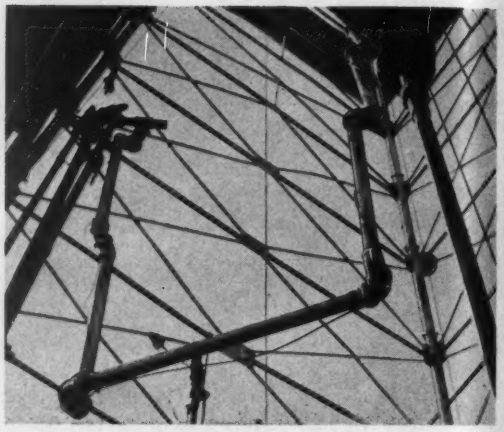

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Coastal District

Union Sugar Well Now On Production

Westerly limits are still an unknown quantity in the Santa Maria Valley field as the completion of the Moore well on the Union Sugar Co. property and the discovering of what is apparently productive Monterey in the Union Oil Co. LeRoy No. 2 test extend production three and one half miles from the most westerly outpost.

E. H. Moore, Inc. Union Sugar No. 2, a mile and a half northwest of the town of Betteravia, was pumped in Oct. 17 and at last reports was good for more than 200 bbls. of 17 gravity oil with mud content diminishing rapidly. The top of the Monterey was encountered at 4819 ft., the top of the so-called Franciscan at 5047 ft. and the well bottomed at 5103 ft. A 6⅝-in. liner, perforated from the shoe of the 9-in. at 4822 ft., was landed on a plug set at 5050 ft.

Three new projects have been started by the Moore interests: Union Sugar No. 3, drilling below 700 ft.; No. 4, preparing to spud; and No. 5, which will use the rig and equipment employed in drilling No. 2.

Union Sugar No. 3 offsets the LeRoy No. 2 of the Union Oil Co. which drilled into the Franciscan at 5300 ft. and plugged bottom from 5334 ft. to 5280 ft. The Monterey was cored at 5018 ft. and after setting 8 ⅝-in. at 5035 ft., the company is making a series of formation tests below the shoe to determine the possibilities of the horizon.

While completions in the older sections have been few, only two wells being brought in during the past two weeks, operators have announced locations for 14 new wells, most of which are grouped in the various "hot spots". New wells on production are the Ohio Oil Co. Moretti No. 2, sec. 21, which encountered the Monterey at 3912 ft., the Franciscan at 4064 ft. and pumped in for 250 bbls. of 16.2 gravity oil, and the Sed Oil Co. No. 1 which came in from 4425 ft. with 340 ft. of Monterey and Franciscan open, pumping oil and water at an estimated 200-bbl. rate. The latter well is located in sec. 27 and offsets the SM Oil Co. No. 1, the 400-bbl. producer responsible for the staking of eight new wells during the last fortnight. In sec. 21, Pacific Western will drill Hobbs No. 5 as an offset to the O'Donnell well and Union Oil will offset Hobbs No. 2 with Russell No. 3. A mile south and west the Navy Oil Co., Inc., will drill lot 28 of the Paderewski subdivision.

As an indication of the activity in this field, a recent count showed 13 drilling wells, 17 preparing to drill and four staked locations upon which work has not been started.

Pet. Sec. Abandons Los Alamos Project

The Petroleum Securities test of the Los Alamos Rancho, sec. 6, 7-32, has been abandoned at a depth of 6530 ft. after coring several hundred feet of steeply dipping hard gray fractured shale formation. Started originally as a joint test with the Hancock Oil Co., the latter withdrew from the venture when no showings were encountered to 6000 ft. and the hole was carried down to bottom by Petroleum Securities.

Associated Leonis I In Fractured Shale

The Santa Rita Hills exploratory test of the Tidewater Associated Oil Co., Leonis No. 1 located in sec. 3, 6-33 and seven miles east of the town of Lompoc, has passed through the serpentine conglomerate and is now penetrating a hard brown fractured shale formation below 4450 ft. As yet this well has not encountered showings of consequence.

Vaca Well At Oxnard Making 20 Bbls. Daily

The Vaca Oil Exploration Co. Livingston No. 1 in sec. 6, 1-21, in the Oxnard area, after coring alternate strata of lava and silt, heavy oil sand to bottom at 4270 ft., set water string at 3610 ft. and 4¼-in. perforated liner to bottom, ran tubing and the well put on the pump with production estimated at 20 bbls. per day of 12 gravity oil and a like amount of water. In sec. 10, 1-22 the Oxnard Oil Co. is testing the water shutoff on 7-in. cemented at 5680 ft. Drilled originally to 6302 ft., the hole was plugged to 6200 ft. to test oil sands found between 5700 ft. and 6192.

Hancock Huasna Well Makes Production Test

The Hancock Oil Co. Huasna test, Scherer-Dickes No. 1 in sec. 30, 12-33, has been bottomed at 3361 ft. for a production test. A 6⅝-in. oil string which included perforated pipe from 2159 ft. to bottom was landed at 3360 ft. and the well is being bailed. The fluid is reported to be mud and oil and is considerably gas cut.

Hollister Well Gets 10,000,000 C. F. Gas

A 10,000,000 c.f. gas flow was obtained in Hollister No. 1 by the Gaviota Oil Co. when the well was put on production last week. With the hole open from the shoe of the 8⅝-in. at 3185 ft. to bottom at 3205 ft., tubing was run to 3195 ft. and the well brought in by reversing circulation. Only a trace of oil is in evidence but salt water to the amount of about 60 bbls. per day accompanies the gas. As ocean water was used in drilling, observers have been slow in deciding whether or not this is formation water. Some years ago the Western Gulf Oil Co. produced gas and salt water from two tests of this property.

California Crude Oil Production

For Two Weeks Ended October 12, 1937

Field	October Daily Quota	Average Daily Production	Excess
San Joaquin Valley			
Beiridge—North	14,870	16,404	1,534
Beiridge—South	1,935	1,974	39
Buena Vista	17,805	18,237	432
Coalinga—East	11,715	10,560	*1,155
Coalinga—West	5,145	4,994	*151
Coffee Canyon	4,250	4,860	610
Edison	3,515	4,120	605
Elk Hills	8,630	10,916	2,286
Fruitvale	8,895	8,547	*348
Greeley	2,250	1,782	*468
Kern Front	10,400	9,907	*493
Kern River	5,235	2,520	*2,715
Kettleman No. Dome	79,615	81,963	2,348
Lost Hills	4,710	4,650	*60
McKittrick	5,725	4,613	888
Midway-Lakeview	10,535	18,930	8,395
Midway-Maricopa	36,800	38,554	1,754
Mount Poso	16,490	18,716	2,226
Mountain View	17,355	17,228	*127
Round Mountain	5,570	9,723	1,153
Ten Section	3,030	3,059	29
Other Fields	2,700	2,820	120
TOTAL	278,175	295,137	16,962
Coastal District			
Elwood	7,365	8,200	835
Rincon	2,790	3,380	590
Santa Maria	15,895	14,051	*1,844
Santa Paula-Newhall	5,210	5,200	*10
Ventura Avenue	32,405	34,968	2,563
Other Fields	6,505	7,347	842
TOTAL	70,170	73,146	2,976
Los Angeles Basin			
Alamitos Heights	1,255	1,776	521
Brea-Olinda	6,930	6,083	*2,847
Coyote—East	2,910	4,052	1,142
Coyote—West	9,295	6,890	*2,405
Domingues	25,135	29,028	3,893
El Segundo	6,085	19,286	13,201
Huntington Beach—New	16,610	21,127	4,517
Huntington Beach—Old	14,465	16,375	1,910
Inglewood	15,990	16,136	146
Long Beach	53,745	58,574	4,829
Montebello-Extension	7,830	8,378	578
Playa del Rey	7,640	7,888	248
Richfield	7,575	8,633	1,058
Rosecrans	2,555	4,630	2,075
Santa Fe Springs	37,820	41,240	3,420
Seal Beach	7,675	7,596	*79
Torrance-Hermosa and Extension	6,560	7,619	1,059
Wilmington	40,030	60,651	20,621
Other Fields	1,970	2,050	80
TOTAL	274,075	328,012	53,937
STATE TOTAL	622,420	696,295	73,875

*—Shortage.

Texas Undecided As To Location At Oxnard

The Texas Co. is apparently having trouble deciding where to locate its next Oxnard venture. After announcing a location on the Chaffee property in sec. 19,2-21 the company reconsidered and moved to the Edwards lease where as yet no work has been done.

Richfield In Difficulties In Sidetracking Job

The Richfield McFarland No. 1 near the town of Camarillo, is experiencing difficulty sidetracking a bit at 4645 ft. as the formation continues to be hard volcanic rock. As the volcanics here are of considerable thickness, progress will be slow for some time.

State Drilling Report

Field	Company	Well	No.	Sec.	Twp.	Range
		NEW WELLS				
Wilmington	Bankline Oil Co.	Domingues Harbor Community	748	34	4S	13W
	Royalty Service Corp.		23-7-2	33	4S	13W
		Heaton	1	33	4S	13W
		Price	2	33	4S	13W
	Buckeye Union Oil Co.		1	32	4S	13W
	Colter & McAdoo	Colter	1	32	4S	13W
	MacDonald & Burns	Banning	2	32	4S	13W
	Gus Pococrats	Nix Community	1	33	4S	13W
	General Petroleum Corp.	Ford	5-A	4	5S	13W
		Isco	A-5	4	5S	13W
El Segundo	Standard Oil Co.	Refinery	4	13	3S	15W
	The Ohio Oil Co.	A. S. Gough	9	7	3S	14W
	Richfield Oil Corp.	McCray	1	12	3S	15W
	The Texas Co.	Security	5	18	3S	14W
Long Beach	Hilldon Oil Co.	Flood Control	3	13	4S	13W
	Exeter Oil Co., Ltd.	Transport	5	30	4S	12W
Huntington Beach	Standard Oil Co.	Huntington A	34	34	5S	11W
Coyote Hills	Standard Oil Co.	Coyote 2	11	22	3S	10W
	Oil Income Corp.	Anderson	1	22	3S	9W
Ventura	Tidewater Associated Oil Co.	Lloyd	69	27	3N	23W
Santa Maria Valley	Pacific Western Oil Corp.	Hobbs	5	31	10N	34W
	A. N. Macrate	Rice	2	23	10N	34W
	A. D. Mitchell	Wilson	1 & 2	27	10N	34W
	Hancock & Bush	California Lands	2	30	10N	33W
	Signal Oil & Gas Co.	Libeu	1	26	10N	34W
	York Oil Co.	Doane	1	27	10N	34W
	Union Oil Co.	Vicente	1	21	10N	34W
	Frank Jones	Gallison	1	26	10N	34W
	Geo. F. Getty, Inc.	Vicente	1	27	10N	34W
Santa Barbara County	C. B. Gauthier, Trustee		17-1A	22	4N	26W
San Luis Obispo	Little Cuyama Oil Co.	Little Cuyama	1	3	10N	26W
Rincon	Continental Oil Co.	Grubb	8	30	3N	23W
Beiridge	Reward Oil Co.		7	34	27S	20E
	Beiridge Oil Co.		61-27	27	27S	20E
			1-28	28	27S	20E
	Tidewater Associated Oil Co.		1	21	27S	20E
Midway	Brookshire Oil Co.		3	24	31S	22E
Sunset	Otis Hoyt	Maricopa	7	7	11N	23W
	Standard Oil Co.		2	25	12N	24W
Lost Hills	The Texas Co.	Theta	2-27	2	26S	20E
McKittrick	Goforth & Bradfield		7	18	30S	22E
Mount Poso	Sunset Oil Co.	Vedder	5	28	26S	28E
	Ring Oil Co., Ltd.	Shapiro	2	32	26S	28E
		Bowles-39	4	29	25S	28E
	Dwight G. Vedder	B. N. B.	2	32	26S	28E
Kern River	Republic Petroleum Co.	Cal Tech	1	24	28S	27E
	Ted Martin, Trustee		2	17	28S	27E
	Alfred Fuhrman		11 & 12	28	28S	28E
	The Texas Co.	Lehmann	11	23	28S	27E
Fruitvale	Western Gulf Oil Co.	Red Ribbon Ranch	9	27	29S	27E
Mountain View	No. American Oil Consolidated	Tupman	2	9	31S	29E
Edison	Monterey Exploration Co.	Nichols	2	14	30S	29E
Greeley	Standard Oil Co.	K. C. 11	11	17	29S	26E
Ten Sections	Standard Oil Co.	K. C. 15	1	27	30S	26E
Trico Gas	Trico Oil & Gas Co.	Bryson	1	28	24S	23E
Kettleman North	Kenda		38	12	22S	17E
Kern County	Amerada Petroleum Corp.		5	22	26S	19E
	Seeco Petroleum Corp.	Armstrong	1	9	26S	26E
Tulare County	Trico Oil & Gas Co.	Valley	2	35	21S	25E
Fresno County	Associated Petroleum Co.	Associated	1	14	21S	21E
Kings County	Pyramid Production Co.	Retherford	1	27	24S	18E
	DEEPEN OR REDRILL					
Wilmington	Pacific Western Oil Corp.	Ronan Community	1	33	4S	13W
	General Petroleum Corp.	Patten	1	4	5S	13W
	Wilmington Oil & Develop. Co.	Community	1	33	4S	13W
Long Beach	South Basin Oil Co.		2	29	4S	12W
	A. T. Jergins Trust		13	19	4S	12W
	Bolsa Chica Oil Corp.	Mutual	4	30	4S	12W
	Western States Drilling Co.	Eskaqee	1	29	4S	12W
Coyote Hills	Hathaway Co.	Anderson	5	18	3S	9W
Montebello	St. Helens Petroleum Co.	Monterey	20	2	2S	12W
Torrance	Richfield Oil Corp.	Kleinmeyer 4-A, 5-A, 7-A, 8-A, 9-A, 11-A, 13-A, 1-B, 10-B		19	4S	13W
		Kleinmeyer 2-A, 3-A, 14-A, 15-A, 32-A		24	4S	14W
		Kleinmeyer	16-B	30	4S	13W
Santa Fe Springs	General Petroleum Corp.	Santa Fe	37-A	5	3S	11W
Coyote Hills	Severns Drilling Co.		3	24	3S	11W
Richfield	Standard Oil Co.	L. Vejar	1	34	3S	9W
Huntington Beach	Howard F. O'Brien	Bristol	1	10	6S	11W
Los Angeles County	Hilldon Oil Co.	Flood Control	1	11	4S	13W
Lost Hills	Standard Oil Co.	Cahn	47	9	27S	21E
Midway	Joseph McDonald		3	26	31S	22E
Coalinga	Inca Oil Co.		12	24	20S	14E
Kettleman North	Standard Oil Co.		72	19	21S	17E
Mountain View	Allied Petroleum Corp.	Allied	20	19	30S	29E
	National Oil Co.	Cowan	1	30	30S	29E
Fruitvale	Wallace Taylor	Dixie Lee	1	23	29S	27E
	ABANDON					
Long Beach	Freeman Oil & Gas Co.		1	19	4S	12W
	Richfield Oil Corp.	Anderson	1	29	4S	12W
		Delaney-Freeman	1	29	4S	12W
	Ring Oil Co., Ltd.		17	13	4S	13W
	Alfred D. Mitchell	Koeberle	1	20	4S	12W
Montebello	St. Helens Petroleum Co.	Pluma-Briano	8	6	2S	11W
Santa Fe Springs	Richfield Oil Corp.	Elliott	1	1	3S	12W
Potrero	York Oil Co.	Inglewood	1	28	2S	14W
Coyote Hills	Standard Oil Co.	Murphy-Coyote	70	17	3S	10W
Los Angeles County	Camroo Oil Co.	Stern	1	33	1S	9W
Newhall	M. J. Trumble	Henderson	1	1	3N	16W
Orange County	A. S. Johnston Drilling Corp.		30	20	5S	11W
Santa Barbara County	The Hancock Oil Co.	Los Alamos	2	6	7N	32W
Kern River	Well Developers, Inc.	Detert	1	16	29S	28E
Mount Poso	Vedder Petroleum Corp.	Hyde	1	32	26S	28E
	Golden Bear Oil Co.	Hyde	1	32	26S	28E
Elk Hills	Standard Oil Co.	Tupman	30	36	30S	24E
Midway	Five-Way Petroleum Co.		1	31	32S	24E
Sunset	Berry Oil Co.		29	28	12N	24W
Edison	Wood-Callahan Oil Co.	Gerard	2	23	30S	29E
Poso Creek	C. C. M. O. Co.		1	35	27S	27E

Summary	Past Two Weeks	Preceding Two Weeks	This Year To Date	Last Year To Date
Total New Wells	64	55	1248	863
Total Deepened or Redrilled	36	28	542	641
Total Abandoned	21	22	413	361

Carreaga Discovery Well Taken Off Production

The Carreaga district discovery well, E. C. Arnold's Arnold-Apache No. 2 in sec. 8, 8-33, after pumping 50 bbls. per day of 30 gravity oil and the same quantity of water, was taken off production and bailed for several days. No improvement was noted when the well was returned to production, however, and the operators plan to acidize the hole in hopes of building up the flow.

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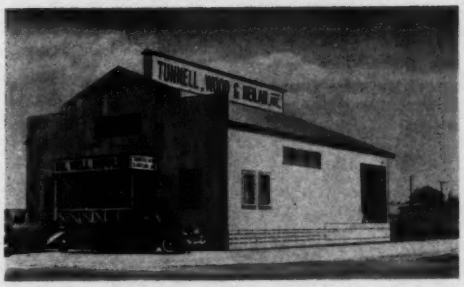

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LAUGH THIS OFF

It has been estimated that when hit by a driver, a golf ball leaves the tee at a rate of 135 miles per hour—curiously enough, the same speed at which the golfer leaves the office.

And speaking of golf, we are not altogether sure about this, but we have been told that the following cute verse was written some years ago in honor of

Herb Eggleston:

Hush-a-bye baby, pretty one sleep,
Daddy's gone golfing to win the club sweep,
If he plays nicely—I hope that he will—
Mother will show him her dressmaker's bill.

Hush-a-bye baby, safe in your cot,
Daddy's come home and his temper is hot;
Cuddle down closer, baby of mine,
Daddy went round in a hundred and nine.

Now comes **Frank Champion** telling how he sat up the other night until 2 a. m. trying to recall something special he had intended to do. Then he remembered that he had intended to go to bed early.

But before we forget, our readers will be glad to learn that the Brea pumper who disappeared last week has been found. He was just waiting his turn on a public golf course.

And **Tom Neilan** says that although wrestlers look strong and husky, they are really an unhealthy lot. Most of them are suffering from the heaves.

On the other hand, **Dave Kilgour** declares that we shouldn't get too excited when the experts tell us that business is looking up, because the same thing is true of a wrestler who is flat on his back.

Says rousty number one, "I hear Axel Grees fell in the sump day before yesterday." Says the second one, "Zat so, was he drowned?" Replies rousty number one, "Don't know, they ain't recovered the body yet."

But we daren't name the driller who confesses that he frequently takes his wife out for a jaw ride.

Or the derrick man who was told a while ago by the doctor that he didn't have enough iron in his blood, and has ever since been shopping around the chain stores.

Lloyd Bayly here tells us about a Scotchman who was recently run over by a beer truck—the first time the drinks were ever on him.

And **Ed Knudsen** claims that he has just met another of these unsophisticated guys who still think the Mack Trucks are a Scotch family.

In a certain oil company boarding house there is a perennial sign on the dining room table which reads, "To avoid having fruit stolen from the table, there will be no fruit." Clever solution, don't you think—or do you?

It recalls a notice we found posted in the foyer of a down town hotel some time ago. "On Saturday next the Blue Room will be used for the Petroleum Producers and Pumpers convention, after which it will be closed for repairs."

And **Jim Craig** says it is safer to have a snapping turtle in the house than a weak-kneed bridge table.

Cy Rubel, on the other hand, the well known impressario of the musical saw and Badminton player extraordinary, claims that when he first met **Wendell Jones,** the latter was just an innocent young lad who thought squash was played with a wet sponge.

And **Miller Huggins'** friend has been losing so consistently at craps lately, he has been obliged to consult a bone specialist.

While **Howard Robinson** has always contended that the lad who really has the drag is the tractor operator.

With which few remarks we are all through with our knitting, as the doctor said when he removed the cast.—R. S.

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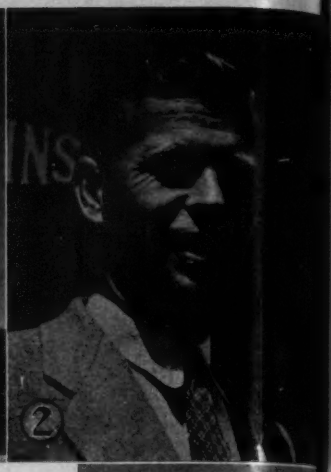

THE GROWTH OF SERVICE ORGANIZATIONS

A decade or more ago, because of the simultaneous development of a variety of advanced oil well appliances, a new relationship between the manufacturer and consumer of oil field specialties came into being. This new relationship consisted of services which were rendered in connection with the supplying and operation of these specialties. At first born of necessity because of the very nature of these new developments, the matter of service facilities gained importance as new developments took place. Today the petroleum industry is thoroughly service-minded and these concerns having staffs of trained specialists available at all times to direct the operation of their own technical or semi-technical devices have earned a very prominent place in the industry.

A pioneer in the development of oil well clean-out tools, The Cavins Co., headed by Paul Cavins, was quick to realize that in order to gain full recognition and acceptance of the Cavins Automatic Hydraulic Suction Bailer and the Cavins Perforation Washer, it would be necessary to locate at all strategic points with complete units of tools and trained personnel.

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1. **Paul Cavins, Gen. Mgr. Cavins Co., Long Beach.**
2. **Waldo Moore, Mgr. Calif. Rental agencies, Long Beach.**
3. **Bob Griffin, Supt. Manufacturing, Long Beach.**
4. **Frank Kehoe, Mgr. Research & Development, Long Beach.**
5. **Bob Eiche, Foreign Representative, Long Beach.**
6. **Howard Walton, Mgr. Fittstown agency, Fittstown, Okla.**
7. **Joe Dabney, Mgr. Ventura agency, Ventura, Calif.**
8. **Daylight Shop crew and office force, Long Beach.**
9. **Tom Sharp, Mgr. Gulf Coast agencies, Houston, Tex.**
10. **Lon Moon, Mgr. Taft agency, Taft, Calif.**
11. **Fred Maze, Mgr. Bakersfield agency, Bakersfield, Calif.**
12. **F. S. Fobes, Mgr. Oklahoma City agency, Okla. City.**
13. **Chas. Trewitt, Mgr. West Texas agencies, Odessa, Tex.**
14. **John Mulcahy, Mgr. Mid-Cont. Rental agencies, Okla. City.**

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IMPERIAL PIPE & SUPPLY CO., 2901 Santa Fe Ave., Los Angeles, Calif., Phone JE. 1104. 12-5-b-tf

Standard Oil Posts Wilmington Prices

With its pipeline to Wilmington under construction, the Standard Oil Co. has posted prices for both Wilmington and El Segundo. The prices for the two fields are:

Gravity	Wilmington	El Segundo
14	$ .75	$ .80
15	.75	.80
16	.75	.80
17	.77	.80
18	.79	.80
19	.82	.82
20	.85	.85
21	.88	.88
22	.92	.92
23	.95	.95
24	.99	.99
25	1.03	1.03
26	1.06	1.06
27	1.10	1.10
28	1.14	1.14
29	1.17	1.17
30	1.21	1.21

The company made no revisions nor changes in prices posted in other fields.

Iniskin Shuts Down Alaska Well At 5070

Iniskin Drilling Co. has shut down for the winter in its Iniskin Bay, Alaska, well. The company ran into heavy gas pressures at 5070 ft., and because of the lack of weight materials, decided to shut down rather than risk junking the hole. Mud was used up in caving formations from 2600 to 3500 ft., formations consisting of hard, impervious shale. From 3500 to 4300 ft., however, increasing amounts of sandstone were encountered, with showings of gas beginning at about 4900 ft. The well will resume operations about May 1, 1938.

Olson Bill Litigants Get Time To File Briefs

The State Supreme Court has granted litigants 20 days in which to submit briefs in connection with a petition commanding the Secretary of State not to submit the Olson tideland drilling bill to a referendum. If the mandate is granted, the bill will be immediately effective; if not, the bill will go before the voters at the next election.